

HORTICULTURAL ABSTRACTS.

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Initialled abstracts in the present number are by T. N. Hoblyn and S. C. Pearce of the East Malling Research Station.

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Horticultural Abstracts

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MISCELLANEOUS.

Field Trials.

451. WISHART, J. 581.084.2 : 519.2
Field trials : their layout and statistical analysis.
Tech. Commun. Bur. Plant Breeding, Cambridge (unnumbered), 1940, pp. 36,
 2s. 6d.

Since the establishment of the Imperial Bureaux, Technical Communications have been issued embodying the latest information about many subjects connected with agricultural and horticultural research. Not least useful have been those which deal with the layout of field trials and the statistical analysis of their results. The Imperial Bureau of Plant Breeding and Genetics has now made a valuable addition to their number. This work is designed primarily for plant breeders, taking up the subject for the first time ; but by virtue of the simplicity with which Dr. Wishart has introduced and made clear the more important types of field trial and the details of their analysis, it will be likely to appeal to a much wider public. The first part of this communication is devoted to a reasoned explanation, with a minimum of algebraic expression, of the idea of experimental error and the way in which it can be measured. This leads naturally to tests of significance and methods of experimental design that will permit of their valid use. The methods of randomized blocks and the latin square are described with a wealth of clear explanatory detail, both with regard to the way in which an actual experiment is arranged and the arithmetical processes of the analysis of variance, wherein the significance of the results is examined. The reader who masters these two fundamental methods of plot arrangement for trials involving a single factor, such as variety, will have little difficulty in following the extension of the argument to multiple factor trials. The remainder of the communication deals more briefly with some of the more complex arrangements designed to overcome the drawbacks of experiments embodying a large number of treatments. Of particular interest to plant breeders is the section dealing with trials wherein the merits of numerous varieties are compared. This communication may be confidently recommended to beginners as one of the best introductions to the subject for the non-mathematical beginner yet available. T.N.H.

452. SAUNDERS, A. R. 581.084.2 : 519.2
Statistical methods with special reference to field experiments. (2nd and revised edit.)
Sci. Bull. Dep. Agric. S. Afr. 200 (*Plant Industry Series* 48), 1939, pp. 112,
 bibl. 112, 1s.

This book sets out to explain statistical methods to experimenters in agriculture and is noteworthy on account of the unusual examples given of the solution of practical biological problems by means of statistics. Thus two methods are given for the comparison of the numbers of suckers thrown up by different kinds of maize, and other examples of discontinuous variation are found, not only in Mendelian ratios, but in the incidence of stalkborers and in the action of insecticides. The usual methods of laying out field experiments are described, including balanced incomplete blocks, split plots, quasi-factorial designs and the confounding of interactions. Analyses of variance are set out for each, as well as analyses involving crops from several years. Regression and interclass, partial and multiple correlations are explained, while the analysis

of covariance is illustrated by corrections for stand, interpolated controls and the results of previous treatments. Notes follow on methods of sampling, missing data and field plot technique. S.C.P.

*Plant hormones.**

453. BONNER, D. M., AND BONNER, J. 577.15.04
On the influence of various growth factors on the growth of green plants.
Amer. J. Bot., 1940, 27 : 38-42, bibl. 14.

The work was carried out at the California Institute of Technology, Pasadena. The growth of *Cosmos* and mustard plants in sand culture is shown to be promoted by additions to root growth factors, leaf growth factors, or of estrone to the nutrient solution. The root growth factors, nicotinic acid and vitamin B₆, in addition to vitamin B₁, whose effect has previously been reported, influence particularly the growth of the root system. The effects of these substances on the general vigour of the plant may be mainly secondary and attributable to the primary influence on the root system. The leaf growth factor adenine appears to influence primarily leaf size. However, both adenine and a second purine, uric acid, exert marked effects on the general vegetative growth of plants. These effects may be secondary to the influence on leaf growth. In confirmation of the earlier work of others, additions of estrone were found to promote the growth of plants. [From authors' summary.]

454. ROBERTS, R. H., AND STRUCKMEYER, B. E. 577.15.04 : 581.145.1
The point of origin of the blossom inducing stimulus.
Science, 1939, 90 : 16.

The successful transfer of the flower-forming stimulus by a graft contact depends on whether the species used will give a systemic or only a local response to a photo-period treatment of only part of the plant. The presence of flowers on the branches is not essential to the branches functioning as donors of the stimulus to flower. The responses to grafting and to donor branches depend upon the flowering habit of the species, and the effects of a temperature girdle (a current of cool air) or banding with a light india rubber band, both on the stem, in causing blossoming indicate that the stem of the plant plays a part in the appearance of blossoms as well as does a leaf-formed hormone-like substance.

455. SMITH, P. F. 577.15.04 : 581.162.3
The influence of 3-indole-acetic acid on pollen germination.
Science, 1939, 90 : 163-4, bibl. 2.

3-indoleacetic acid in concentrations of 1 in a million stimulates the germination of pollen grains, increases the rate of elongation of the tube, increases the percentage of germination and produces a longer tube length in a given period, in this case 4 hours.

456. VAN OVERBEEK, J. 577.15.04
Auxin in marine algae.
Plant Physiol., 1940, 15 : 291-9, bibl. 18.

The work was done at the California Institute of Technology, Pasadena. Auxin concentrations of much the same strengths as those in the higher plants, oats and peas, were found in marine algae. The auxin of *Macrocystis* was found to be indoleacetic acid.

457. CHOLODNY, N. G., AND GORBOVSKY, A. G. 577.15.04 : 612.014.44
Effect of indole-3-acetic acid on photosynthesis.
Science, 1939, 90 : 41.

Indole-3-acetic acid is shown to cause a temporary intensification of photosynthesis on being directly introduced in very low concentrations into the assimilating tissues of the green leaf.

* See also 499, 500.

458. BATES, G. H. 631.53 : 577.15.04 : 547.944.6
Polyploidy induced by colchicine and its economic possibilities.
Nature, 1939, 144 : 315-6.

The use of colchicine to induce polyploidy in plants is discussed. The achievements from a cytological point of view have been remarkable, but whether they will be of material value to the plant breeder remains to be seen. Possibly the results may be most remunerative in the case of garden plants where abnormal or unusually large flowers are in demand. In food plants increased size is not always of importance; tetraploids are of frequent occurrence but seldom of special merit. At present the chief value of artificially induced polyploidy seems to lie in the production of fresh material on which to build.

459. RIVES, L. 634.8-1.535 : 577.15.04
Hormones végétales et bouturage de la vigne. (Hormone treatment of vine cuttings.)
Progr. agric. vitic., 1940, 113 : 220-4.

The author tried the effect of immersing 56 cuttings of the Riparia Berlandieri hybrid 420A and the direct producer Couderc 13 to a depth of 3 centimetres overnight in a solution of 2 spoonfuls to 10 litres of water of Hortomone A before planting and compared their growth with that of 54 similar cuttings similarly immersed in water alone. The difference in actual rooting was negligible in 420A and nil in Couderc 13. But it was very noticeable that the roots and the general growth achieved by the Hortomone-treated cuttings were very much superior to those of the untreated cuttings in 420A and at least definitely better in the case of Couderc 13.

460. VAN OVERBEEK, J. 577.15.04
Auxin distribution in seedlings and its bearing on the problem of bud inhibition.
Bot. Gaz., 1938, 100 : 133-66, bibl. 33.
 SCOTT, F. M. 577.15.04
Anatomy of auxin-treated etiolated seedlings of *Pisum sativum*.
Bot. Gaz., 1938, 100 : 167-85, bibl. 7.
 AVERY, G. S., AND LA RUE, C. D. 577.15.04
Growth and tropic responses of excised *Avena* coleoptiles in culture.
Bot. Gaz., 1938, 100 : 186-99, bibl. 10.
 BONNER, D. M. 577.15.04
Relation of environment and of the physical properties of synthetic growth substances to the growth reaction.
Bot. Gaz., 1938, 100 : 200-14, bibl. 10.
 BONNER, J., AND GREENE, J. 577.15.04 : 577.16
Vitamin B and the growth of green plants.
Bot. Gaz., 1938, 100 : 226-37, bibl. 20.
 STUART, N. W. 577.15.04
Nitrogen and carbohydrate metabolism of kidney bean cuttings as affected by treatment with indoleacetic acid.
Bot. Gaz., 1938, 100 : 298-311, bibl. 6.
 GOLDBERG, E. 577.15.04
Histological responses of cabbage plants grown at different levels of nitrogen nutrition to indole (3) acetic acid.
Bot. Gaz., 1938, 100 : 347-69, bibl. 11.
 HAMNER, K. C., AND BONNER, J. 577.15.04 : 612.014.44
Photoperiodism in relation to hormones as factors in floral initiation and development.
Bot. Gaz., 1938, 100 : 388-431, bibl. 18.

GRACE, N. H. 577.15.04
Effects of plant and animal hormones on [wheat] seeds damaged by formaldehyde.

Canad. J. Res., 1939, 17, Sec. C., pp. 445-51, bibl. 3.

BATES, G. R. 631.531.17

Growth behaviour of plants following seed treatment by organic mercury compounds.

Nature, 1940, 145 : 262-3, bibl. 5.

Vernalization.

461. REIMERS, F. S. 581.143.26.03 : 635.11 + 635.12

Vernalization of beetroot and turnip. [Russian.]

Vegetable Growing, Moscow, 1939, No. 2-3, pp. 27-30, bibl. 3.

The Vegetable Institute of the U.S.S.R. found that the following methods gave the best vernalization results:—Beetroot and turnip seed are sown at the beginning of February in 8 cm. deep sand boxes. One part of compost or rich garden earth should be added to five parts of sand, the latter being pure river sand. The boxes are placed in a well-lighted room kept at a temperature of 15° to 18°C. until the shoots appear on the surface of the boxes. Before the turnips open their cotyledons, boxes with these plants are transferred for 40 days to a cool room having a temperature of 1° to 3°C. The room may be dark. Plants held for vernalization purposes in darkness must not suddenly be exposed to bright sunlight. Plants are next allowed to remain for a short time in boxes outside to develop a greater vigour, after which they are transplanted to the field (in spring). The germinating beetroot plants require for vernalization, in contrast to turnips, plenty of light and a temperature of 5° to 7°C. The treatment lasts 60 days.

462. MCKINNEY, H. H. 581.143.26.03

Vernalization and the growth-phase concept.

Bot. Rev., 1940, 6 : 25-47, bibl. 77.

A review of the present position of knowledge. Among conclusions reached by the author of interest to the horticulturist are the following. In general the chilling method of vernalization has been found to accelerate sexual reproduction with greater certainty than the high temperature method in the particular species for which each method is recommended. Although most investigators outside Russia fail to recognize any great commercial gain from the methods as applied to small grain, forage crops and cotton in regions where the crops are adapted, the chilling method does appear to be valuable for forcing flowering in daffodils, bulbous iris and Easter lily. The method would, moreover, seem to offer commercial possibilities for speeding up seed production in certain biennials such as beet and to be very valuable for hastening seed production in genetic and plant improvement work. Burr and Turner had at first unsuccessful trials with tomato and cucumber but later achieved success with tomato seed, in earlier maturity and increased yield. In the first trial it is suggested that the seed was kept too long before planting. Yamamoto reports favourable results on seed production in radish from chilling seedlings. van Hoek successfully vernalized potato tubers in a lighted box at 18°-20°C. for 26 days. Treated tubers grew more quickly, were stronger and matured 6 days ahead of the controls. Their yield was slightly greater, as was the size of the tubers. A number of successes have followed the treatment of beet seed. Chesnokov also claims that turnip, cabbage and carrot seeded more freely the first season, when the young seedlings were chilled than when slightly germinated seeds were chilled. For acceleration of blooming in ornamental plants the reader is referred to *Commercial flower forcing* by Laurie and Poesch.*

463. POTAPENKO, YA. I., AND ZAKHAROVA, E. I. 581.141/2 : 634.3/9

Seed biology of woody plants. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1939, Nos. 21-22, pp. 3-9, bibl. 5.

On the basis of experiments conducted in U.S.S.R., which are described here in some detail, the plants studied could be divided into three groups according to the different behaviour of

* Publishers, Blakiston, Philadelphia.

their seed from year-old seedlings. The difference in behaviour as shown by the germinating capacity of the seed and subsequent growth is said to be due to the stage of development reached by the parent plants at the time when seed is taken from them. Thus low temperature is necessary for the growth of willow, poplar and elm seedlings (group 1), such seedlings having completed their first growth period and germinated in the spring. The second group includes cherry. Cherry seedlings obtained from seed, which on removal of stone and seed coat has germinated in summer will also require low temperature for subsequent development, while non-germinating seed, from which the seed coats have not been removed, must first be exposed to low temperature to induce germination. Apples, pears and other representatives of the third group, develop their seed towards the end of their growing season and this seed is dormant. Hence, seed germination and normal growth of the seedlings can only take place after the provision of low temperature and requisite moisture. Another set of experiments with apple seed, detailed descriptions of which are given, led to the following conclusions :—The seed cannot be induced to germinate by dry storage at different temperatures. The seed of different apple varieties requires for stratification different temperature and length of treatment, e.g. the seed of Siberian apples requires a lower temperature and a shorter stratification period than that of other varieties growing under less severe climatic conditions.

Nutrition.

464. COMMITTEE ON CHEMICAL METHODS. 581.192

Determination of mineral elements in plant tissue.

Plant Physiol., 1940, 15 : 121-30, bibl. 33.

Notes are given on the determination of aluminium, calcium, chlorine, magnesium, phosphorus, potassium, silicon, sodium, sulphur, and of boron, copper, iron, manganese and zinc ; and mention is made of aids to the determination of the inorganic fraction of mineral elements.

465. SERDOBOLSKY, I. P., AND MATSKEVICH, V. B. 631.83

A sedimentric method for determining potash in solutions and extracts. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1939, Nos. 21-22, pp. 29-35, bibl. 11.

The centrifugal method for potash determination which is here described is quick and is thought to be sufficiently accurate to be employed in the study of soil requirements for potash fertilizers.

466. KRAMER, P. J. 581.144.2 : 631.8

Root resistance as a cause of decreased water absorption by plants at low temperature.

Plant. Physiol., 1940, 15 : 63-79, bibl. 32.

Root systems of tomato and sunflower plants formed the experimental material. The principal cause of decreased water absorption by plants at low temperatures appears to be the combined effects of decreased permeability of the root membranes and increased viscosity of water, resulting in increased resistance to water movement across the living cells of the roots.

467. FERGUSON, W., AND WRIGHT, L. E. 631.8 : 546.27

Micro-element studies with special reference to the element boron.

Sci. Agric., 1940, 20 : 470-87, bibl. 31.

A summary of observations made by the Canadian Horticultural Division or taken from the literature on the subject. Among practical conclusions reached are the following :—Turnips probably need boron most at the time when their root development is greatest. The inclusion of borax or boric acid in 2 of the regular spray mixtures for apple trees was one of the most efficient methods of application to raise the boron content of the fruit for the prevention of cork and drought spot. The application of lime to orchard plots was accompanied by increased cork and drought spot. The higher boron content of the soil from such plots indicates a fixation of

boron. It is estimated that an acre of productive apple orchard will need between 44 and 90 grams of boron or 14-28 oz. of borax yearly. Turnips, cauliflowers, celery, tomatoes, apple trees, chrysanthemums, cabbage and corn show certain symptoms and effects of insufficient and excess boron; these are described. Small excesses of manganese affected the foliage and yield of tomato plants. The addition of very small amounts of copper, zinc, uranium and strontium was accompanied by reduced tomato yields.

468. EATON, S. V. 546.27 : 632.19
Effects of boron deficiency and excess on plants.
Plant Physiol., 1940, 15 : 95-107, bibl. 20.

The two plants here examined for both toxicity and deficiency are the sunflower and for deficiency only the soya bean. The symptoms are discussed. Plants differ greatly in their susceptibility to boron deficiency and excess. Moreover the conditions under which they are grown considerably affect susceptibility. The range between deficiency and toxicity may be quite narrow; thus boron at a concentration of 0.5 p.p.m. afforded good growth in the sunflower, but at 1.0 p.p.m. it was definitely toxic.

469. PEROTTI, R. 546.27 : 63
 Gli studi italiani sul fondamento dell'impiego del boro in agricoltura. (**Italian work on the use of boron in agriculture.**)
Phytopath. Z., 1939, 12 : 421-4, bibl. 24.

In this article the director of the phytopathological institute of the University of Pisa, which lies close to the most important world source of boron, sums up the more recent research of his institute on the following points:—The presence of boron in the soil and in plant tissues, and its effect on soil microflora and on higher plants with particular reference to its use as a fertilizer and therapeutant.

470. BRANDENBURG, E. 546.27 : 63
 Ueber die Grundlagen der Boranwendung in der Landwirtschaft. (**Boron in agriculture.**)
Phytopath. Z., 1939, 12, pp. 112, bibl. 121.

Boron deficiency, its symptoms and its cure are here discussed on the basis of German experience with the various root crops belonging to the *Brassica* and *Beta* families. So far no disease of apple, cauliflower, celery and lucerne has been reported from Germany which could be attributed to this cause.

471. BURRELL, A. B. 634.11-2.19 : 546.27
Boron deficiency and internal cork of apples.
Proc. 85th annu. Meeting N. York hort. Soc., 1940, pp. 84-9.

Experience in New York State indicates four main symptoms of the boron deficiency disease of apples, namely internal and external cork of the fruits, and dieback and rosette of the vegetative parts. The application of boron effects a cure. Applications by injection of salts, by irrigation and by spraying are found to have particular disadvantages. Boron is best applied in the fine granular form of borax ranging from 2 oz. in the case of trees planted 4-6 years and 3½ inches in diameter to 12-16 oz. for trees of 25 years and over, 15 inches and upwards in diameter. It should be made about the time of delayed dormant or pre-pink sprays in the spring and should be spread in a circle about 2 feet wide under the tips of the branches. Once every three years will generally suffice. It should not be applied in the first instance until the symptoms are apparent. A warning is uttered that the margin of safety is low and great care should be taken not to exceed the amounts suggested, nor to spread unevenly.

472. CHITTENDEN, E. 546.27 : 634.11-2.19
Use of borax sprays in the control of internal cork of apples.
N.Z. J. Sci. Tech., 1940, 21 : 303A-4A.

The use of hydrated borax and rasorite (a natural borate) in spray form for the control of internal cork of apples has been further tested. Satisfactory control of internal cork was obtained with borax sprays even of 0.10 per cent. concentration. No difficulty was experienced in the use of hydrated borax or rasorite in combination sprays which included lead arsenate, lime-sulphur, colloidal sulphur, and spreaders. The use of hydrated borax or rasorite in these sprays did not noticeably increase the amount of russetting or detrimentally affect the foliage. The inclusion of hydrated borax (0.10 per cent.) in the commercial spray programme during November is recommended as an alternative to soil top-dressings of borax or rasorite in the control of internal cork of apples. [Author's summary.]

General.

473. KUDRYAVTSEVA, A. A. 581.035
Reflection, absorption and penetration of solar radiation into the green parts of agricultural plants. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1940, No. 2, pp. 11-5, bibl. 23.

Experiments at Moscow in 1934, only the salient results of which are reported here, concerned among others the following plants:—peas, annual and perennial lupins, vetches, horse bean, soybean, sunflower, a type of mushroom, mustard, flax, swede, beet, gourds, cucumbers, carrots, parsley, lettuce, cabbage, tomatoes and egg-plants.

474. VAN OVERBEEK, J. 581.184.5 + 577.15.04
Phototropism.
Bot. Rev., 1939, 5 : 655-80, bibl. 119.

A well-documented review of modern theory. The relation of auxin effect to phototropism is discussed.

475. MONAKINA, T. A., AND SOLOVEY, G. T. 585.2 : 631.541 : 635.25
Grafting monocotyledonous bulbous plants. [Russian.]
Vernalization, Moscow, 1939, No. 4(25), pp. 140-1.

In experiments conducted at Odessa onion bulbs were cut in half and "grafted" to halves of other onion varieties. The grafts were held firmly together by pinning or tying and the grafted plants were grown in moist sand or soil under different temperature and moisture conditions. Compatibility was remarkably frequent. The authors note that, surprisingly successful as this experiment was, its results are of little practical value.

476. TANASHEV, G. A. 581.142/3
Diagnosis of root viability of agricultural plants. [Russian.]
Proc. Lenin Acad. agric. Sci., Moscow, 1940, No. 1, pp. 14-20, bibl. 19.

The recommended method consists essentially of staining seed rootlets of maize, cotton, peas, gourds and beet with congo-red, eosin-blue and indigo-carmin. Rootlets retaining the stain, and, to a less extent those which partly retain the stain after rinsing in distilled water, have greater viability and more rapid and vigorous growth than those which lose all dye after rinsing.

477. GAUGAIN, S. 778.5 : 63
A survey of films on agricultural subjects.
Int. Rev. Agric. (Mon. Bull. agric. Sci. Pract.), 1940, 31 : 1T-11T, 89T-93T.

The International Institute of Agriculture, Rome, is conducting a survey of films on agricultural subjects throughout the world. It is proposed to treat each country separately by giving a short review of the organization for production of such films followed by a classified list of the

subjects with the titles. A questionnaire has been sent to 52 countries and much information has been made available in reply. So far the films of Italy, pp. 6T-11T and Finland 89T-93T have been described.

478. RUYS, J. D. 41.312.1

Horticultural nomenclature.

Int. Rev. Agric. (Mon. Bull. agric. Sci. Pract.), 1939, 30 : 237T-56T.

The rules and recommendations for the nomenclature of horticultural plants as laid down by the International Committee of Horticultural Nomenclature are given and discussed, with a preface setting out the somewhat chequered early history of the rules of botanical nomenclature with which they are, of course, closely bound up.

TREE FRUITS, DECIDUOUS.

Selection and breeding.

479. POTTER, J. M. S. 634.11-1.521

Lessons from the Wisley fruit trials. I.

J. roy. hort. Soc., 1940, 65 : 85-7.

This is the first of a series of short articles on the fruit trials of the Royal Horticultural Society at Wisley. The basic idea of the trials, which were started in 1923, is to provide an unbiased test of new varieties of fruit. The standard procedure is to get the variety from its raiser and propagate it, after selection, at Wisley. If it is successful it is again propagated and introduced into the trials of the 8 sub-stations in different parts of the country. On the very light Wisley soils the use of ample fertilizers, especially potash, has been necessary. In the notes which are to be given of the results of the trials fine quality and regularity of bearing, i.e. the special aim of the private gardener, will be kept in view rather than such market factors as colour, transport, quality and total crop per acre. It should be noted that old varieties are also under trial. The first article deals with apples. Taken in order of maturity, among early dessert apples commended are the two Canadians, viz. Melba and Patricia, of soft and juicy flesh. Next, in order of earliness, to receive mention are Laxton's Epicure followed by James Grieve and Ellison's Orange. Then comes Lord Lambourne, and this is followed by the still incomparable Cox's Orange Pippin. Just behind Cox in time of ripening is Laxton's Superb, which crops well but is hard to keep within the bounds of a cordon. Others also get their mention, among them Allington Pippin for its flavour in pies. No late variety is found wholly acceptable, St. Cecilia being too susceptible to sulphur damage, but to the apple fancier Belle de Boskoop and Orleans Reinette are recommended.

480. KOVALEV, N. V. 634.1/7 : 581.5

The chief laws governing ecological differentiation of fruit trees. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1940, No. 1, pp. 5-9.

This is a brief description of the differentiation of wild species of *Malus*, *Pirus*, *Prunus*, *Amygdalus*, *Corylus*, with reference to their ecological characteristics in the chief areas of distribution.

481. FORTUNATOV, I. K. 634.1/2 + 634.7/8 : 631.61

Cultivation of fruit trees and berries in the Karaganda Steppe. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1940, No. 2, pp. 22-5.

Very severe climatic conditions in the Karaganda Steppe (U.S.S.R.) limit the choice of apples, plums, cherries, currants, gooseberries, raspberries, strawberries and vines chiefly to hardy

Siberian and American varieties. Great care is needed to protect the plants from winds, lack of water, frost and drought. The total area under cultivation covers some 741 acres.

482. ARENDT, N. K.

634.37

Results of the work on fig trees at the Nikita State Botanical Gardens. [Russian.]

Publ. (Nikita) Lenin Acad. agric. Sci., Moscow, 1939, Vol. 14, No. 4, pp. 40, 1-25 roubles.

The major points of investigation since 1925 have been as follows:—1. Introduction. 2. Varietal studies. 3. Release of nursery material to horticulturists in the South of U.S.S.R. 4. Breeding new and better varieties. 5. Agricultural methods. 6. Biology of the fig tree in its different stages. Results are presented in tabular form. The original collection of fifty odd varieties had increased by 1938 by more than 200 from France, Italy, Germany, Tunis, Morocco, Palestine, United States and different parts of U.S.S.R., Notes appear on hardiness, drought resistance and cropping capacity of the more important Crimean varieties. The fruiting biology of the fig is dealt with fairly fully and includes notes on structure of inflorescences, flowering and pollen compatibility. It appears that while most varieties in the Crimea are self-fertile, some require pollinator varieties. Ripening dates of the different varieties are discussed and their respective uses in the food industry are noted. Among the varieties recommended for cultivation in the (warmer) Yalta and Alushta districts of the Crimea there are drying, canning and dessert varieties. A number of other Crimean and introduced varieties need further trial. All the more promising varieties for cultivation in the Crimea, Transcaucasia and Central Asia are described. Of the agricultural methods particular importance was attached to propagation methods and pruning. Propagation with the aid of summer (green) cuttings and woody cuttings in winter has given better results than layering. Grafting and budding is rarely done in the Crimea where propagation by cuttings presents so little difficulty. Where used the best method of grafting proved to be working scions from young trees on to the vegetative shoots of fully grown trees in spring. Of the pruning methods under Nikita Gardens conditions the so-called American method was most satisfactory. It consisted essentially in leaving 4-5 scaffold branches and removing annually one-third or two-thirds of long shoots. Pruning should be done late in autumn or early in spring. The differentiation of varieties in response to pruning was very marked.

483. CRANE, M. B., AND LEWIS, D.

634.13 : 581.4 : 581.144.3/4

Genetical studies in pears II. A classification of cultivated varieties.

J. Pomol., 1940, 18 : 52-60, bibl. 9.

The John Innes detailed investigations with the morphological classification of pears have so far been confined to leaf and shoot characters. As the work proceeds and a larger number of seedlings reach fruiting age, an attempt will be made to include flower and fruit characters in the classification. The authors summarize as follows:—A classification table, with a key, is given for the identification of eighty-one cultivated varieties of pears. The classification is based on inherited differences of the leaves and shoots. The morphological differences described in the paper and used in the classification are:—(i) *Leaf margin*. The margin of the spur growth leaves may be toothed, serrate-crenate, S, or entire, s. (ii) *Leaf midrib*. This may be eglandular, E, or glandular, e. Within the glandular class the number of glands per leaf varies, the mean number being characteristic for each variety. (iii) *Shoot hairiness*. Three classes have been formed based on this character, hairy, H, sparsely hairy or glabrous, h. (iv) *Shoot colour*. The summer shoots may be red-purple, R, or green, r. Within the coloured class different intensities of colour occur. (v) *Leaf colour*. Green, G, or pale green, g. Breeding experiments have shown that the characters used in the classification are genetically controlled. In the above description the dominant character is given first. Thus, toothed leaf margin, S, is dominant over entire leaf margin, s, and so on. Out of twenty-four theoretical classes expected on genetic recombination of characters, sixteen are represented in the eighty-one varieties examined.

484. RYABOV, I. N.

634.25

Classification of peaches. [Russian.]*Lenin Academy of Agricultural Sciences, Moscow, 1939, pp. 32, bibl. 14.*

A study was made at the Nikita State Botanical Gardens of wild and cultivated peach varieties from Central Asia, Transcaucasia, Afghanistan, Kashgaria, Turkey and Iran, and as a result a classification system with a key to identification is presented. Its advantages over those previously used are pointed out. According to it all the cultivated varieties belong to the two species:—1. *Persica vulgaris* Mill; 2. *Persica ferganensis* Kost et Riab. The varieties belonging to the first species are grouped according to the shape of flower into:—1. Var. *rosaeflora* and 2. Var. *campanulaeflora*, each of these two groups having botanic and economic characteristics of its own. Within each of these botanical groups, there are groups of varieties which have in common certain morphological and biological characters and are at present predominantly cultivated in certain areas. Var. *rosaeflora* peaches are divided into the following groups:—1. American early ripening peaches; 2. Chinese cling type (North China); 3. Turkestan Iranian peaches; 4. Honey type peaches (South China). Within the var. *campanulaeflora* so far only two groups could be noted: 1. The Iranian group of peaches of the Phillips cling type and 2. The Iranian group of peaches of Crawford type.

485. GRÜNER, M. N.

634.11-1.541.11

Apple seedling development. [Russian.]*Proc. Lenin Acad. agric. Sci., Moscow, 1939, Nos. 23-24, pp. 6-12, bibl. 10.*

Experiments were carried out at the Maikop Research Station, U.S.S.R. Buds were taken from either crown or shoots of 5 six-year-old apple hybrid varieties and worked in August 1936 on to 1½-year-old Caucasus apple seedlings, which were specially selected according to size, and on to clonal paradise stocks. Each of the three experimental series involved 8 budding operations on every hybrid seedling and 1 operation on each paradise stock. In autumn 1937 and spring 1938 the budded portions on the trees behaved differently according to what buds had been originally used. There was a marked difference in the following characters:—(1) total shoot growth, (2) total number of main and secondary branches, (3) the angle of the branches, (4) leaf size, (5) pubescence of leaves and stems, (6) time of leaf bud burst, and (7) year of first flowering.

Rootstocks.

486. ANON.

631.541.11 : 634.1 + 634.2

Fruit stocks [in Palestine].*Agric. Suppl. Palestine Gaz. 35, 1938, pp. 218-21, and 38, 1939, pp. 32-6.*

The first of these articles deals with pome, the second with stone fruits. I. *Pome fruits.* (a) Stocks for apples. Khashali, a local stock. Does best in irrigated soils, but is non-drought-resistant, short-lived and liable to blow over. Doucin is successful in most districts except the hot Jordan valley and on calcareous hillsides. It is too vigorous on rich soils. Apple seedlings form very large, long-lived hardy trees, which give small yields. Paradise stocks give small, early bearing, short-lived trees. East Malling stocks are under trial. Quince stocks are not recommended. (b) Stocks for pears. Seedling pear stocks are preferred for most, especially for dry, soils. They produce vigorous and disease-resistant trees with a tendency to sucker. Quince is good in soils, rich in humus and in shallow, not too calcareous soils. It is liable to wind damage. It sometimes needs double working. Hawthorn cannot be recommended. Other stocks on trial are *Pyrus serotina*, *P. ussuriensis*, *P. Calleryana*. (c) Stocks for quince. Only quince are used. II. *Stone fruits.* The chief snag here lies in the prevalence of the capnodis beetle and of nematodes. The rootstocks used are as follows:—(a) Almond. It is used for apricots, plums and peaches, but with none is the union quite satisfactory. It is best for dry rocky calcareous hillsides or dry sandy plains. It is unsuitable for heavy, wet soils and is also susceptible to nematodes. (b) Apricot. The apricot is gaining ground as a stock for all stone fruit owing to its resistance to nematodes. It will grow well even in shallow soils and

where there is brackish water. Budding is difficult, but once made the union is good. Good for plums but not so good for peaches. (c) Peach. This is the most vigorous stone fruit stock. Is best suited to light, fertile, well-drained soils. It is susceptible to, but survives, capnodis. It is, except for certain varieties, susceptible to nematode. Seed from local trees produces much better stocks than imported seed. It is very good for peaches and good for Japanese, but not all European plums; apricots are shortlived on it. (d) Myrobolan. This is best suited for heavy, wet soils. It is easily raised and worked, but is highly susceptible to capnodis and nematode. Most varieties blossom profusely when worked on it but set little fruit. (e) St. Julien is found unsuitable. (f) Sweda, a local stock, is used in rich, deep, irrigated lands but suckers badly and has low resistance to capnodis. (g) Karassia, another local stock, shows marked resistance to capnodis but suckers less than Sweda. There are sweet and sour types. It is under investigation. (h) East Malling stocks including marianna, common mussel, common plum, damas C, brompton and pershire are under trial. (i) *Prunus Davidiana* from Japan is now under trial as a stock for peaches.

487. WOODHEAD, C. E., AND MOUAT, H. M. 634.11-1.541.11
Apple rootstock investigations I.
Orchard. N.Z., 1939, 12 : 279-81, bibl. 4.

A descriptive account of Malling apple stocks Nos. I, IX, XII, XIII, XV and XVI in New Zealand is given. Northern Spy, the common N.Z. stock, has not proved equal to the best Malling types in producing well-rooted stocks on the stool and is very susceptible to powdery mildew (*Podosphaera leucotricha*). In all other aspects of nursery propagation it is equally satisfactory and it is, moreover, immune to woolly aphid.

488. MEIER, K., AND BRYNER, W. 634.13-1.541.11 : 634.14
 Versuchsergebnisse mit den typisierten Quittenunterlagen A, B, C, East
 Malling über Heranzucht von Birnhochbüschen. (The use of Malling quince
 stocks A, B and C for high bush pear trees.)
Schweiz. Z. Obst-u. Weinb., 1939, 48 : 263-7.

A study was made in Switzerland of growth and habits of a dozen pear varieties worked on Malling quince stocks, A, B and C. The results summed up very briefly were as follows:—The grafts all took well but some scions were more vigorous on some stocks than on others. It was not possible to observe stock effect on hardiness but several varieties on quince C were more susceptible to scab than on A and B. It may be noted that purposely no fungicides were used. In nearly all cases the vigour of the shoots coincided with their longitudinal growth. The vigour of individual varieties on the different stocks varied very much, being generally greatest on C.

489. EVREINOFF, V. A. 633.25-1.541.11
L'Amygdalus Petunnikowii Litw. (Amygdalus Petunnikowii Litw., a
 remarkable peach rootstock.)
Fruit belge, 1939, 7 : 129-30.

A brief, extremely enthusiastic, but not very informative note on a rootstock for peach trees recently introduced into Belgium. The author states that it is a native of Turkestan where it grows on the western slope of Thian-Chan up to 1,000 m. above sea level as also in the desert plains, on arid, stony, limestone soils. It will thrive on very alkaline soils. It is, in fact, a typical xerophyte and is completely hardy. It forms a small bushy tree with staggered blossoming and deep roots. It is immune to two of the worst peach diseases, namely, *Exoascus deformans* and *Monilia cinerea* and, what is more, transmits this immunity to scions worked on it. The author notes that the sole difficulty is in getting plants, since fruiting is only assured under the geographical conditions of its native habitat.

Root growth.

490. BALLENEGGER, R. 581.144.2 : 634.1/2
 Gyümölcsfa-gyökérképek. (**Fruit tree root systems.**) [French summary.]
Bull. roy. Hungarian hort. Coll., 1938, 4 : 10-5.

The author describes with illustrations the root systems of an 18-year-old apricot grafted on myrobalan, and of a 17-year-old pear on quince. In both cases the root systems were vigorous, extending far beyond the area covered by the crown. Most of the roots were at a depth of 60-120 cm., which is deeper than those on a previously excavated apricot grafted on almond. This indicates that the roots of myrobalan and quince are not so susceptible to lack of aeration as those of almond.

491. DOMOKOS, J. 581.144.2 : 634.1/2
 Beiträge zur Frage der Wurzelbildung der Obstbäume. (**Fruit tree root formation.**)
Bull. roy. Hungarian hort. Coll., 1939, 5 : 40-4, bibl. 6.

The author's investigations, which are in progress under the Hungarian Ministry of Agriculture but are not described, indicate so far that the chemical and physical character of the soil together with the water table are the limiting factors to root growth in fruit trees. Within these wide limits root pictures vary with the variety. The habit of the root system depends in any given rootstock on the scion variety worked thereon. The different seedlings have only a quantitative influence on root formation.

*Pollination.**

492. BOWMAN, F. T. 634.1/2 : 581.162.3
Pollination of fruit trees. The present state of research [in Australia] and its application to fruit culture.
J. Aust. Inst. agric. Sci., 1939, 5 : 212-7, bibl. 10.

This paper consists of the Australian national report to the section on pollination of the Twelfth International Horticultural Congress, Berlin, July 1938 [the full report of which had not been published at the outbreak of war in September, 1939]. The fruits dealt with are pears, apples, cherries, European and Japanese plums, and almonds. The following notes are taken from the summary.

Little pollination research work has been carried out in Australia except in N.S. Wales and Victoria. Studies in Victoria have shown the low degree of self-fruitfulness of apple and pear varieties and the self-sterility of cherry varieties. In N.S. Wales pollination experiments are being made on a large scale in connexion with breeding work. The extent of dependence of many apple and pear varieties on cross pollination has been established. The secondary effects of seed development derived from cross-pollination on shape and size, chemical composition and hanging abilities of the fruit, as shown by studies with the Williams pear, have led to the recommendation that cross pollination should be ensured, even for self-fertile varieties. A long list of compatible crosses is now available. Sweet cherries are found to be entirely dependent on cross-pollination and suitable pollinators have been discovered. Most of the chief varieties of European, Japanese and cherry plums are found to be self-fertile and satisfactory pollinators have been found for most varieties. In the almond, although some varieties show some degree of self-fruitfulness, cross-pollination is desirable and suitable pollinators have been found.

493. HALL, E. R. 634.22 : 581.162.3
The pollination of the plum on Vancouver Island, British Columbia.
Sci. Agric., 1940, 20 : 488-96, bibl. 6.

Pollination experiments for the purpose of discovering compatible, incompatible and self-sterile varieties of plum in Vancouver Island were carried out. The results are tabulated. Victoria and Michelson seem to be effective general pollenizers.

* See also 455.

494. LEDEBOER, M. S. J., AND KRIJTHE, E. 581.162.3 : 634.1/2
 Stuijmeelonderzoek bij vruchtboomen. (**Investigation on fruit-tree pollen.**)
Meded. TuinbouwvoorlichtDienst., **15**, 1939, pp. 28, bibl. 12, fl. 0.30.

A study of the germination of the pollen of some apples, pears, plums and cherries is given and the results are tabulated with those of other workers in previous years. In addition lists are given of those varieties of which the previous reputation for good or bad germination is confirmed by these investigations, also a note of the poor pollen germination of 6 apples and 1 pear of which little has hitherto been written. A large proportion of English varieties is included.

495. BROWN, A. G. 634.11 : 581.162.3
The order and period of blossoming in apple varieties.
J. Pomol., 1940, **18** : 68-73.

The order and period of flowering at Merton, Surrey, of 120 apple varieties, mostly worked on Mallings IX, but some on Mallings V stock, is given for the years 1937, 1938 and 1939. Year to year differences of up to 23 days were found in the time of flowering of particular varieties. Differences in temperature in early March were found to affect the time of flowering more than later differences. Varieties which only just overlap by a few days in the three-year average will not always be able to pollinate each other. Hence it is suggested that to ensure cross-pollination varieties with closely-corresponding flowering times should be planted together.

496. KOBEL, F. 634.23 : 581.162.3
 Die Befruchtungsverhältnisse der Kirschen. (**Cherry pollination in German-speaking Switzerland.**)
Schweiz. Z. Obst- u. Weinb., 1939, **48** : 65-9, 87-94.

A list is given of 89 cherry varieties grown in Switzerland with appropriate pollinators.

497. RAPTOPOULOS, T. 634.23 : 581.162.3
Pollen germination tests in cherries.
J. Pomol., 1940, **18** : 61-7, bibl. 13.

The tests described here were made to discover if any correlation exists (a) between the chromosome number of the plants and the viability of their pollen, and (b) between the number of cells in the tetrad, the diameter and the germination of mature pollen grains. The material used included sweet, sour, and Duke cherries as well as Chinese Early (*Prunus cantabrigiensis*). Results, which are of importance to the breeder, are set out and summarized.

Growth and nutrition.

498. BELL, H. P. 634.11 : 581.4
Calyx end structure in the Gravenstein apple.
Canad. J. Res., 1940, **18**, Sec. C, pp. 69-75, bibl. 5.

The development and structure of the calyx end of the Gravenstein is compared with that of a number of other varieties. This comparison indicates :—(i) that the calyx end of the Gravenstein exhibits an unusual degree of variation in its mode of development ; (ii) that at maturity it is usually composed of a tissue which is exceptionally fissured and porous ; (iii) that most of these fissures and pores are radial slits ; and (iv) that, as these openings are so unusually large and numerous in the Gravenstein, its calyx end must be structurally weaker than the corresponding structure in the other varieties. It is suggested that the prevalence of open core in the Gravenstein is due to this structural weakness of the calyx end. [Author's summary.]

499. GARDNER, F. E., MAATH, P. C., AND BATJER, L. P.

577.15.04 : 634.11-2.19

Spraying with plant growth substances to prevent apple fruit dropping.

Science, 1939, **90** : 208-9.

Naphthalene acetic acid and naphthalene acetamide sprayed on apples reaching maturity, in concentrations of .00025%, have produced very marked inhibition of fruit dropping in U.S.A. [See abstract 500.]

500. GARDNER, F. E.

577.15.04 : 634.11-2.19

Control of the pre-harvest drop of apples by spraying with plant hormones.

Proc. 85th annu. Meeting New York hort. Soc., 1940, pp. 94-105.

The author summarizes the previous season's work at the U.S. Horticultural Station, Beltsville, Maryland, on the prevention of abscission by spraying with plant hormones. Thirty separate spraying experiments were made on a large number of apple varieties. All of them responded to treatment markedly by delay in fruit abscission. The growth substances used were dissolved in a little ethyl or methyl alcohol to facilitate solution and added directly to water in the spray tank. The addition of a spreader or sticker is advised. Power sprays were used, 7-8 gallons of spray being applied to small and up to 25 gallons for large trees. Naphthalene acetic acid and naphthalene acetamide were outstandingly the best of the substances used. There are indications that a concentration of 5 parts per million will provide effective control of dropping. It was found that with most varieties the effect of the sprays reached a peak in 5 or 6 days and may continue quite effective for 2 or 3 weeks varying with concentration and variety. Hence, the sprays are best applied as the drop begins in order to utilize their greatest period of effectiveness. It was found that successive sprayings will keep most of the fruit on the trees past maturity until it rots. Although addition to ordinary protective sprays would not appear to impair efficacy, the time of application would generally prevent their incorporation with these. The addition of oil to the spray appreciably increases its effectiveness. The choice of spreader appears to be immaterial. McIntosh was in a class by itself as regards duration of the response to treatment, which was much shorter, i.e. about 8-9 days only. This suggests the desirability of a second spray applied as the first runs out. Special attention must be paid in spraying to hitting all the fruit. The only observable effect on the fruit is the excellent colour developed. The effect of early sprays at blossom fall appeared to be negligible. Although excellent the results so far achieved are not thought to represent the last word.

501. DORSEY, M. J.

634.25-2.19

A study of the cause of "buttons" in the J. H. Hale peach.

Bull. Ill. agric. Exp. Stat., **458**, 1939, pp. 43, bibl. 26.

Unlike normal peaches buttons survive all three of the drops. They fall behind normal peaches in the rate of enlargement during the first growth period. The stone is greatly reduced in size and hardens a little later than in normal peaches. Buttons ripen later than the rest of the crop and sometimes reach a surprisingly large size. It is shown that the most probable cause of buttons is single fertilization, i.e. gametic fusion with either the egg or the fusion nucleus. Retardation of the growth processes, or light pollen transfer when the weather is unfavourable, appears to be an important factor in their production.

Soils and manures.

502. DUNKLE, E. C., MERKLE, F. G., AND ANTHONY, R. D.

634.11-1.83

Potash availability in Pennsylvania orchard soils.

J. Amer. Soc. Agron., 1939, **31** : 438-58, bibl. 9.

Forty-seven commercial orchards in Pennsylvania were examined and soil and leaf samples were taken. Surface soils were higher than subsoils in replaceable K and loss of top soil by

erosion is a factor in increasing the need for the application of K. The amount of replaceable K was found to be related to the organic matter content of the soil. The rapid method for determining replaceable K compared favourably with the quantitative cobalti-nitrite method and was satisfactory for determining the general level of soil K. Leaf analyses did not correlate with the replaceable soil K but in some cases gave indications of the effects of potash applications which could not be detected by exchange analyses. [From authors' summary.]

503. GOURLEY, J. H., AND WANDER, I. W. 631.83 : 634.11
The lateral distribution of potassium in an orchard soil.
J. Amer. Soc. Agron., 1939, 31 : 590-7, bibl. 5.

To test experimentally a method of deep application, a set of holes was bored beneath certain apple trees and a potash fertilizer was introduced. The spread of the potash was noted. Observations indicate that in this Wooster silt loam soil potash fertilizers might profitably be dropped behind a deep tillage tool to a depth of 16-18 inches. They would thus be within the active absorbing zone of the tree roots and also below the zone in which potassium is fixed by alternate wetting and drying. Its lateral movement should then be ample to supply further needs.

504. BALLENEGGER, R. 634.25-1.83
 Az őszibarack levele és hajtása humujának összetételéről. (**Wood and leaf diagnosis in peach trees.**) [French summary.]
Bull. roy. Hungarian hort. Coll., 1939, 5 : 9-16.

Wood and leaf diagnosis of peach trees growing on different plots and showing different yields shows that the leaves of the trees growing in the soil with a K content of 35-40 mg. per 100 grams are throughout the season higher in potash than those of trees growing in a low potash soil with a K content of 14-16 mg. This difference also persisted in the analysed ash of the young, year-old shoots.

505. BALLENEGGER, R. 634.25-1.432.2
 Adatok az őszibarack termőhelyének ismeretéhez. (**Studies on the ecology of the peach.**) [Summaries in French.]
Bull. roy. Hungarian hort. Coll., 1936, 2 : 3-13 ; 1937, 3 : 3-27 ; 1938, 4 : 3-10 ; 1939, 5 : 3-9.

In these articles the author describes his investigations on the soil moisture in a peach orchard near Bude in Hungary on a clay soil, which contains, however, a certain amount of lime and on which peaches do extremely well. The amount of rain in the 4 years under review was respectively normal, rather heavy, heavy and light. The curves showing the moisture content in the soil layer between 30 and 180 cm. below ground level were very similar in all four years. Where the soil was kept cultivated the moisture content was in all cases greater than that under sod. Briefly, soil moisture was found to depend on the amount of precipitation, on soil temperature, on the elevation of the plot and on methods of cultivation.

506. LARSEN, J. A. 631.542 : 634.1/2
 Vinterbeskæring af Frugttræer. (**Winter pruning.**)
Dansk Frugtavl, 1940, No. 1, pp. 746-9.
 PALLESEN, A. 631.542 : 634.1/2
 Beskæring af andre Træer og Buske. (**Pruning fruit trees and bush fruits.**)
Dansk Frugtavl, 1940, No. 1, pp. 749-51.

SMALL FRUITS AND VINES.*

507. CHEVALIER, A. 634.7
 Sur les lianes fruitières intéressantes: les *Actinidia*. (Interesting fruit-bearing climbers: *Actinidia*.)
Rev. Bot. appl., 1940, 20: 10-5.

Notes are given of a number of *Actinidia*. The genus is described as Indo-Malayan and Sino-Japanese and contains species which are hardy in temperate regions. A plant growing on a wall in the Jardin des Plantes, Paris, is described. It was obtained from seed supplied by David Fairchild of the U.S. Department of Agriculture and was supposed to be a hybrid between *A. chinensis* and *A. arguta*. The author disagrees and has named it *A. latifolia* Merr. var. *deliciosa* var. nov. He considers it to be worth propagating and distributing since the fruit is very palatable.

508. METCALF, F. P. 634.71
 New species and critical notes on *Rubus*.
Lingnan Sci. J., 1940, 19: 21-37, bibl. 9.

Ten new species and 4 new varieties of *Rubus* are described from China. Two new combinations have been made and a number of new synonyms added.

509. HOWELL HARRIS, G. 634.711
 Raspberry nutrition IV.† Can the Cuthbert raspberry be saved in coastal British Columbia?
Sci. Agric., 1940, 20: 344-54, bibl. 9.

The causes of decline of raspberry growing in coastal B.C. are numerous. Among them are deficiencies in nitrogen, phosphorus, sulphate and potash. These can be easily detected by foliar diagnosis. There are indications that plants receiving micro elements in the experiments were more resistant to mosaic than the others. Although the beneficial effect of peat is noteworthy, the bulk necessary precludes its use. Water is shown to be a limiting factor in the light upland soils. Ammonium phosphate was the best vehicle of phosphorus in the coastal soils. Liming was detrimental. Under conditions of ample manuring and watering clean cultivated crops gave the best results, but for the normal grower, the use of cover crops, especially vetch, is recommended. Nitrogen should probably be applied in early spring and then in small quantities at intervals as foliar diagnosis shows the necessity. Applied in the autumn it is wasted. There appears to be no one cause for raspberry decline. Each case needs individual diagnosis and remedy, and given such the decline should be stopped.

510. EVREINOFF, V. A. 634.72²₅
 Essai de classification de nos variétés de groseilliers à grappes. (A new classification of ~~gooseberries~~ red currants).
Fruit belge, 1940, 8: 5-11.

A new classification of gooseberries is described. The classification is based on their botanical origin and is claimed to be simple and utilizable by all. The author uses for identification the structure of the flower, the structure of the leaf, fruit carriage and fruit. He classifies into 5 families as follows:—(1) Versailles, the name of a typical variety of this group. This group is derived from *Ribes vulgare* Lam. (2) Impériale—derived from *R. rubrum* L. (3) Gondouin—Prince Albert derived from *R. Gondouinii* Jancz. (*R. petraeum* and *R. vulgare* Lam.). (4) Hollandaise derived from *R. pallidum* Otto and Diet. (*R. petraeum* × *R. rubrum*), and (5) Anglaise derived from *R. Houghtonianum* Jancz. (*R. rubrum* and *R. vulgare*). The points deciding the classification are considered in detail.

* See also 459.

† For previous articles in the series see *Ibidem*, 15: 525, 16: 353, 17: 707, *H.A.*, 5: 372, 6: 284, 8: 415.

511. MERRILL, T. A. 634.73-1.415

Acid tolerance of the highbush blueberry.

Quart. Bull. Mich. agric. Exp. Stat., 1939, 22 : 112-6, bibl. 3.

There is a minimum pH limit for the blueberry plant at approximately pH 3.2. Symptoms associated with too great acidity are leaf scorch beginning at the margins and finally death of the plants. Of the several treatments, applications of lime sufficient to raise the pH to 3.4-3.8 prevented leaf scorch and resulted in normal growth. [Author's summary.]

512. SHAW, F. R., BAILEY, J. S., AND BOURNE, A. I. 634.73 : 581.162.3

The comparative value of honeybees in the pollination of cultivated blueberries.

J. econ. Ent., 1939, 32 : 872-4.

Experiments carried on for 3 years at Amherst, Mass., showed honey bees to be effective pollinators of cultivated blueberries, although in this respect they were found inferior to the bumble bee.

513. ANON. 634.75

Strawberry survey.

Scott. J. Agric., 1939, 22 : 358-63.

The great variation in crop results of Scottish strawberry plantations within comparatively small areas led to a survey being made. Some 148 premises in all were visited. *Soils*. These were mainly medium, well-drained loams. In some instances crops on light soils were a failure. *Drainage*. Although Lanarkshire disease was bound up to a certain extent with bad drainage, it was not confined to badly drained soils. *Soil reaction*. There were indications that excessive alkalinity caused more damage than excessive acidity. *Age of beds*. The general practice is to destroy beds after two or three years. It is noticeable that on the average 3-year-old plants give a higher yield than 2-year-old, but less than 4-year-old plants. Later, however, the yields rise again, probably because only the more vigorous and best cultivated crops are allowed to remain. *Frequency of cropping*. The best results were obtained where agricultural land was taken over for strawberries. *Manuring*. In general the best results were obtained where heavy dressings of dung had been given or where lighter dressings had been supplemented with artificials. *Disease*. The two main diseases are red core or Lanarkshire strawberry disease (*Phytophthora* sp. Heoch.) and yellow edge. *Cropping*. Expressed in order of importance the factors that appear to limit production are red core, poor cultivation and prevalence of weeds, inadequate manuring, weather, yellow edge (in certain varieties), age, influence of variety, wrong methods of planting and disturbance of root system during summer.

514. DUMONTHAY, J. 634.75

Une nouvelle variété de fraise hybride à gros fruit : "Belle de Châtelaine".

(A new large-fruited strawberry variety.)

Rev. hort., Suisse, 1940, 13 : 88-9.

Runners of this new large-fruited variety are now available from l'Ecole d'horticulture de Châtelaine. This variety was obtained from a cross between Madame Moutot and President A. Dufour.

515. * ANGELO, E., IVERSON, V. E., BRIERLEY, W. G., AND LANDON, R. H. 634.75-2.111

Studies on some factors relating to hardiness in the strawberry.

Tech. Bull. Minn. agric. Exp. Stat. 135, 1939, pp. 36, bibl. 59.

The study includes investigations in Minnesota on the development of hardiness in strawberry varieties, on the effect of winter soil temperatures in the environment of the strawberry and some other herbaceous plants, and on the respiratory rate of dormant strawberry plants.

516. LOREE, R. E. 634.71

The boysenberry in Michigan : a preliminary report.

Quart. Bull. Mich. agric. Exp. Stat., 1939, 22 : 109-10.

517. POTAPENKO, YA. I., AND ZAKHAROVA, E. I. 634.836.76-1.541.11

Growing vines on hardy stocks in Russia. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1940, No. 2, pp. 16-21, bibl. 14.

Under Mitchurinsk conditions (Central Russia) it was found possible to increase the hardiness of fine tender Mitchurin and other named grape varieties, by working them on hardy stocks such as Baitur and Korinka (Mitchurin varieties), *Vitis amurensis*, and the seedlings 45 and 46. The Russian Concord was highly compatible with all scion varieties worked on it, but as a stock it was not sufficiently hardy in the winter 1938-9. The grafting operation and subsequent treatment of the worked vines are described.

518. NEGRUL', A. M., AND KONDO, I. N. 634.8-2.111

The character of hardiness inherited by the buds of vine hybrids. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1939, No. 23-24, pp. 13-7, bibl. 8.

Experiments conducted by the Institute of Plant Industry, U.S.S.R., in Tashkent led to the following conclusions:—1. The tolerance of vine buds to artificially produced frost had a very wide range. It varied with species and variety. Of the varieties used for crosses *Vitis amurensis* Rupr. was the hardest followed by *V. rupestris* Scheel, *V. vinifera* L. *prol. occidentalis* Negr. and *prol. pontica* Negr. 2. Interspecific hybridization gave on the average intermediately hardy hybrids. On comparison with the hardy parent the hybrid's hardiness fell to approximately 5° below normal and rose as compared with the tender parent to over 2°. 3. Crossing *V. vinifera* L. *prol. orientalis* Negr. varieties with one another did not give any hardy hybrids. 4. Crossing the latter with *V. vinifera* L. *prol. occidentalis* Negr. produced hybrids that were as regards hardiness intermediate between the two parents. 5. Hybrids from the crosses of *V. vinifera* L. *prol. orientalis* Negr. vines with varieties of *prol. pontica* Negr. were, on the average, harder than the hardy parent plants. The best hybrids were considerably more so, and they were nearly as hardy as *V. amurensis* Rupr. hybrids. 6. The hardiness of hybrids obtained by self-pollination was on the average lower than that of initial forms.

519. BROWNE, F. S. 634.8

Growing grapes for home use.

Publ. Dep. Agric. Canada 664, 1939, pp. 4, being *Circ.* 147.

In Canada good quality grapes can be produced for home use, at a moderately high cost, over large areas where commercial production would be impossible. Hints are here given on training vines, treatment during second year, pruning, and soil. Varieties must be chosen according to their climatic requirements.

520. PIROVANO, A. 634.872

Nuove uve da tavola redditizie senza semi. (New seedless table grapes.)

Ortofrutticoltura ital., 1939, 8: 173-6, bibl. 5.

After discussing the results of some of his crosses aimed at the production of good seedless table grapes the author describes the qualities of some of these products. Among them are No. 75, a product of normal crossing of Muscat of Alexandria and Sultanina and Nos. 165 (Maria Pirovano) and 166, the two latter having the same parents but in these cases the flowers of the original matrix had been submitted to radioactive ray treatment. Both the latter are regular, if not heavy, croppers. No. 165 produces a small early crop followed by a second one in October. It is fairly hardy but prefers a dry climate not liable to sudden changes in temperature. No. 166 is even harder and more adaptable. It is a heavy cropper and the bunches can be left on the vine till October. Both are compatible with American stocks. The author notes that the breeder is very unlikely to produce vines possessing both seedless and large grapes. At the same time the absence of pips will mean that the nutrients meant for them will be present in the grapes and the grapes will in consequence be full of flavour and valuable nutrients.

521. HUMBERT, A. 634.835.094
Un producteur direct intéressant. (An interesting direct producer.)
Progr. agric. vitic., 1940, 113 : 157-9.

A note is given of an early maturing direct producer vine called Seyve-Villard No. 5-276 blanc. The author considers that it is the first direct producer arising from 50 years' experiments, which possesses all the qualities necessary in a strain worthy of propagation. The wine made from it is said to resemble exactly in appearance that of Pinot blanc Chardonnay and, if it is not entirely up to the best of the old vines in bouquet produced, it is at least not far behind.

522. CASELLA, D. 634.8-1.541.11-1.535
Ancora su la propagazione della *Vitis* Berlandieri. (A further contribution on the propagation of the Berlandieri vine.)
Ann. Fac. Agrar. Portici, 1938-9, 10 : 133-50, bibl. 6.

A strong reply to a recent article by Cosmo on the same subject in the *Annuario della R. Stazione Sperimentale di Viticoltura e di Enologia di Conegliano*, in which doubt was cast on the efficacy of Casella's method for propagating Berlandieri from cuttings. Casella notes the great success achieved by his method in Tunis and he expounds his theory on the migration of enzymes and their importance for root emission in Berlandieri cuttings.

523. MEIER, K. 634.8 : 581.144.4
Weinqualität und Blattfläche. (Wine quality and leaf area.)
Schweiz. Z. Obst- u. Weinb., 1939, 48 : 257-63.

Observations made at Landquart, Wädenswil and Malans in Switzerland showed that vines with a greater leaf/fruit area produced juices with a significantly higher sugar content (Oechsle weight) and produced more wood. These results confirmed earlier investigations.

PLANT PROTECTION OF DECIDUOUS FRUITS.*

524. YU, T. F. 632.3/4
A list of important crop diseases occurring in Kiangsu Province 1934-1937.
Lingnan Sci. J., 1940, 19 : 67-78.

The list contains many diseases of fruit trees.

525. GARRETT, S. D. 581.144.2 : 634.2 + 634.3 : 632.3 + 632.4
Losses to world agriculture through root disease of crops.
Chemistry and Industry, 1939, 58 : 953-8, bibl. 9.

Most root diseases are caused by soil fungi, a few by bacteria. The most primitive of the fungi such as *Botrytis* can generally only start an attack on wounded or weakened tissues and only later, after gaining strength, can they invade normal healthy tissues. With increasing specialization to individual hosts the parasite acquires the ability to attack strong growing plants in their prime. With this specialization, however, there comes too an increased threat of extinction of the parasite in the absence of its particular host. Parasites which consequently die out under such circumstances are known as soil invaders. *Fusarium oxysporum cubense* which causes Panama disease is one of these. In some cases where the fungus is specialized to a single species the remedy lies in breeding immune host plants; *Synchytrium endobioticum* which causes wart disease in potato affords an instance. Root diseases of annuals are most effectively eliminated by the practice of crop rotation. Eradication in plantation crops is more difficult. Periodical inspection and removal of infection in individual cases is found to check the incidence of root disease in new rubber plantation after appropriate cleaning operations before planting. To prevent the incidence in young tea of *Armillaria mellea*, derived from the diseased stumps of certain jungle species, it is found that ringing the jungle trees some time before clearing tends to result in the replacement in the stumps of these trees of *Armillaria* by

* See also 467-72.

fungi which are quite harmless to the young tea. Roguing of diseased and neighbouring plants prevents the active spread of root disease. Again, soil reaction may be appropriately modified by liming or sulphuring, soil temperature by varying the date of planting (field crops), soil aeration by draining, cultivation, manuring, etc., so that the fungus cannot thrive. Again it is found in some cases, e.g. that of Panama disease of bananas, that the particular disease is only dangerous to a particular crop in soils of particular physical properties. The remedy is obvious. Moreover, the plant's environment can sometimes be made more favourable to it and less so to the parasite by appropriate manuring.

526. HALL, A. D.

632.111

The glazed frost of January, 1940.*J. roy. hort. Soc.*, 1940, **65** : 118.

This most rare phenomenon of a glazed frost in England merits note. On 27 January in N.E. Hampshire and in many other places in southern England there was a slight break in the frost ; throughout the day the temperature was above freezing and the surface of the ground, which was nearly free from snow, was wet. There was only a slight breeze from the north-east. Just after dusk a thick mist accompanied by fine rain set in. On the following morning the full effects of the weather were manifest ; all exposed twigs and branches were encased in ice and the lawns were like rough matting with the blades of grass sticking up in cylinders of ice. The weight of ice was enormous and many shrubs were bowed to the ground. The weather showed little change during the day till soon after dark when a half-gale sprang up and one could hear the tree branches cracking. The trees which suffered worst were the oaks, from which limbs up to 8 in. in diameter were rent ; silver birches, of which young trees up to 20-30 ft. high were snapped in two ; limes, the tops of which were reduced to bare poles ; and walnuts which lost heavy branches. Conifers were less damaged. It is noticeable that in this glazed frost the cold came with the rain itself ; the fine drops were super-cooled to a very low temperature ; so long as they were suspended in air they remained liquid, but they would flash into ice on contact with any solid body.

527. STAEHELIN, M.

632.111 : 634.1/8

Frostbekämpfung im Obst-und Rebbau. (Frost control in horticulture and viticulture).*Schweiz. Z. Obst-u. Weinb.*, 1939, **48** : 314-20.

Under particular environmental and climatic conditions it was found possible to control spring frosts of 1938 in Swiss orchards and vineyards by means of oil burners. Thus in one instance at Sarvaz normal crops were obtained from heated orchards, whereas in unheated orchards the frost accounted for 90% loss of apricot fruits, 75% of pear blossoms and 20% of apple buds.

528. E.P.

634.8-2.111

Versuche über Frostbekämpfung bei Reben mit verschiedenen Frostschirmen im Kanton Schaffhausen. (Frost screens for vines in Switzerland.)*Schweiz. Z. Obst-u. Weinb.*, 1939, **48** : 121-6.

Of the materials tried at Schaffhausen, straw screens gave the best protection against frost, but they delayed the growth of vines. The results from screening with Parapap, i.e. thick paper made impervious to water, are promising. Pergamyn screens, made of similar material to Parapap, but thinner, offered inadequate protection against frost.

529. GIGANTE, R.

634.22-2.111

Cankri prodotti dal freddo sopra rametti di susino. (Cankers caused by cold on plum branches.)*Boll. Staz. Pat. veg. Roma*, 1939, **19** : 453-72, bibl. 10.

Damage caused by cold to plum branches is described. The simplest phenomena are longitudinal splits extending along the damaged limb, the damaged tissues being separated from the healthy by a layer of cork. In more advanced cases real cankers are found in which the disposition of

the damaged tissues is very irregular and complicated. The cortical tissues in the parts damaged are very irregular and furrowed with numerous gaps, and woody patches can be noted separated from the central tissues by a ring of cork. The cambium is often darkened and sometimes torn showing gaps running between the wood and the cortex. The wood shows irregular hollows due to tearing as the result of stretching and pressure which takes place in the woody tissues. In recently formed strata regular gaps are found, circular or elliptical in shape and full of gum, each separate one being contained in a single woody strand, between one medullary ray and the next. The pith is not altered.

On the bark of the branches reddish orange pustules appeared. These are formations very like lenticels and their function is to take the place of the lenticels which have been badly damaged by the cold.

530. MÜLLER-STOLL, W. R. 634.8-2.112
 Studien über Hitzebeschädigungen an Weintrauben. (**Heat damage to growing grapes.**)
Z. PflKrankh., 1939, **49** : 577-89, bibl. 7.

In very warm, sunny weather damage occurs in unripe grapes which may be limited to the skin of the grape or may extend to the flesh. These two phenomena are easily distinguishable both from one another and from other damage or disease symptoms. Thermo-electric measurements showed that sun-exposed grape skins will stand heat up to 55°C. In young grapes the skins suffer at a temperature of 45°C. upwards, while the flesh may suffer at temperatures of 40-41°C. Grapes which are getting ripe, on the other hand, are fairly unsusceptible to such temperatures. Sometimes excessive heat causes localized discolorations of the skin in ripening grapes. Any such occurrences and their economic consequences can be minimized by seeing that the grape bunches are adequately shaded.

531. ARK, P. A., AND THOMAS, H. E. 634.11-2.19
Apple dieback in California.
Phytopathology, 1940, **30** : 148-54, bibl. 19.

The dieback described here is experienced in trees on soils distinctly acid and low in available nutrients, notably potassium. Certain annuals grown in soil from affected orchards developed boron-deficiency symptoms curable by the addition of small amounts of borax or boric acid.

532. KEMP, H. K. 634.11-2.19
Detection of water core in apples.
J. Aust. Inst. agric. Sci., 1939, **5** : 227-8.

A satisfactory method has been evolved for determining the presence of water core in apples without impairing the value of the fruit for storage tests. The method depends on the luminosity of the fruit, when placed in front of a 100 watt lamp. Badly affected fruit has a bright luminous appearance and can easily be detected, but the detection of only slightly affected fruit is not so easy. A diagrammatic illustration shows exactly the working of the simple device.

533. MEIER, K. 634.8-2.19
 Gelbsucht der Reben. (**Chlorosis in vines.**)
Schweiz. Z. Obst-u. Weinb., 1939, **48** : 41-50, 83-6.

Swiss investigations in 1938 into the causes of chlorosis in vines led to the conclusion that the disease was primarily caused by unfavourable physical soil conditions. In some instances it was also influenced by the high lime content and relatively strong alkalinity of the soil, but only in a very few cases could the disease be attributed to nutrient deficiency in the soil. Development of shallow roots on old and young vines, soil aeration and the use of peat dust to make the soil more friable are thought to be desirable. Further investigations will include the study of the effect of lime and soil reaction on different rootstocks.

534. FISCHER, H. 634.22-2.19
 Einige Beobachtungen zum Pflaumen-und Kirschensterben in Schleswig-Holstein. (**Dying-off of plums and cherries in Schleswig-Holstein.**)
Z. PflKrankh., 1939, **49** : 431-4, bibl. 4.

Infection by *Valsa* spp. and the incidence of dying off in stone fruits were found to depend on the physiological condition of the trees.

535. THOMAS, H. E., AND RAWLINS, T. E. 632.8 : 634.2
Some mosaic diseases of *Prunus* species.
Hilgardia, 1939, **12** : 623-44, bibl. 14.

None of the well-known virus diseases of stone fruits in eastern U.S.A., e.g. peach yellows, etc., has been found in California. The mosaic diseases found in Californian stone fruits are here described according to their different hosts. Similarities between and possible identity of various mosaic diseases of different *Prunus* species are noted.

536. THOMAS, H. E., RAWLINS, T. E., AND PARKER, K. G. 634.25-2.8
A transmissible leaf-casting yellows of peach.
Phytopathology, 1940, **30** : 322-8, bibl. 4.

The symptoms of a yellow virus of the peach in California similar to that found in the North-eastern States are described. It is possibly the same virus as that causing the buckskin disease of sweet cherry.

537. HORNBOSTEL, W. 632.314 : 634.1/2
 Versuche über Wurzelkroppbekämpfung. (**Experiments on crown gall (*Pseudomonas tumefaciens*) control in fruit trees.**)
Z. PflKrankh., 1939, **49** : 1-11, bibl. 18.

German field trials with 1-year-old apple seedlings indicate that crown gall can be significantly reduced by the following measures :—(1) delaying planting in the nursery after shortening the roots, (2) dipping cut-back roots into 1% Uspulun or Ceresan solutions mixed with clay, (3) soil disinfection with 1% Uspulun or Ceresan, or 0.5% Abavit solutions.

538. STAPP, C., AND PFEIL, E. 632.314 : 634/635
 Der Pflanzenkrebs und sein Erreger, *Pseudomonas tumefaciens*. VIII. Zur Biochemie des Krebsgewebes. (**Crown gall, 8th Report. Biochemistry of the diseased tissue.**)
Zbl. Bakt. Abt. II, 1939, **101** : 261-86, bibl. 62.

This is a biochemical study of normal tissues, diseased tissues and tissues adjacent to tumours caused by *Pseudomonas tumefaciens*. Plants used in this study were *Pelargonium*, *Datura tatula*, sugar beet and tomatoes.

539. KEITT, G. W. 632.42 : 634.11
Toxicity of the sodium salt of dinitro-o-cresol to *Venturia inaequalis*.
Science, 1939, **90** : 139-40, bibl. 2.

Elgetol, a proprietary preparation containing 12% by weight of the sodium salt of dinitro-o-cresol with a supplement to aid its penetration, showed, in small-scale spraying experiments, a high degree of eradicator effectiveness against apple scab.

540. RICHARDS, M. C. 634.11-2.4
A soft rot of apples caused by *Trichoseptoria fructigena*.
Phytopathology, 1940, **30** : 328-34, bibl. 3.

Apparently the first report of the finding of this pathogen in N. America.

541. COOLEY, J. S., AND DAVIDSON, R. W. 634.11-2.4
A white root rot of apple trees caused by *Corticium galactinum*.
Phytopathology, 1940, **30** : 139-48, bibl. 5.
 An account of a white root rot of apples caused by *C. galactinum* discovered in 1902 but left unnoticed till 1932. It appears that conditions which accompany the bringing of new land into cultivation are favourable to the organism. Trees of bearing age were found more susceptible than younger ones.
542. BUCKSTEEG, W. 632.48 : 634.11 + 634.23
 Über die Monilia-Anfälligkeit unserer Obstsorten. (**The resistance of German apple and cherry varieties to *Monilia* rots.**)
Z. PflKrankh., 1939, **49** : 11-15, bibl. 3.
 Varieties of apples and cherries are here listed and grouped according to their degree of susceptibility to the *Monilia* fungi.
543. HUSZ, B. 632.42 : 634.1/2
 Hazai adatok a csonthéjas gyümölcsfák gombaokozta levélfoltosságaihoz. I. (**Data on the shot-hole disease of stone fruit in Hungary. I.**) [English summary 1 p.]
Bull. roy. Hungarian hort. Coll., 1939, **5** : 23-39, bibl. 23.
 Data on the incidence of *Phyllosticta prunicola* (Opiz.) Sacc. placed by the author in the genus *Coniothyrium* and called *C. prunicolum* (Sacc.) Husz.
544. ANON. 632.4 : 634.1/8
 La maladie de la criblure des feuilles. (**Leaf damage due to *Clasterosporium carpophilum* (Lev.) Aderh.**)
Memento Déf. Vég. Rabat., **20**, 1939, pp. 6.
 The damage done by *C. carpophilum* is described, the extent and nature of damage to peaches, cherries, apricots, almonds and plums are discussed and control measures by means of different fungicides are suggested.
545. ANON. 632.421.1 : 634.8
 L'oidium de la vigne. (**Vine oidium due to *Uncinula spiralis* Ber. & Cook.**)
Memento Déf. Vég. Rabat., **24**, 1939, pp. 9.
 The development and spread in North Africa of this disease of vines caused by *Uncinula spiralis* Ber. & Cook in nature, the extent of the damage done, and control measures are discussed.
546. DU PLESSIS, S. J. 634.8-2.4
Anthraxnose of the vine.
Fmg S. Afr., 1940, **15** : 97-100, 104.
547. WIESMANN, R. 638.14 : 632.7 : 634.1/8
 Zur Frage der Schädlichkeit der Honigbienen im Obst-und Weinbau. (**The possibility of bees being injurious in orchards and vineyards.**)
Schweiz. Z. Obst-u. Weinb., 1938, **47** : 497-503, 517-52.
 Swiss experiments have shown that bees are incapable of damaging uninjured cherry, strawberry, plum and grape-vine fruits by puncturing them, though wounded fruits present a welcome source of juice to them. While on the rest of the above fruits the activity of bees is regarded as harmless, in the case of grapes it is considered even useful, since by sucking the juice from injured berries they protect healthy grapes from rotting. On the other hand, owing to tenderness of their skin raspberries may be damaged by bees, particularly when they are left unpicked in an over-ripe condition.

548. UMNOV, M. P. 634.37-2.7
The pests of the fig in the Crimea. [Russian.]
Soviet Subtropics, 1940, No. 3 (67), pp. 41-5.
 Economically important pests of the fig. in the Crimea are:—*Simaetis nemorana* Hb., *Hypoborus ficus* Er., *Pseudococcus citri* Risso and *Homotoma ficus* Z. Life history of the pests and control measures against them are described. *Lonchaea aristella*, *Eriophyes fici*, *Lepidosaphes ficus* and others known to be serious pests of figs in other countries could not be found in the Crimea.
549. ANON. 632.653 : 634.11 + 634.13
 Le faux-tigre. (***Monostira unicostata* Muls. et Rey, a tingid pest of pear and apple.**)
Memento Déf. Vég. Rabat, 56, 1939, pp. 10.
 In Morocco this hemipterous pest causes considerable damage to fruit trees, including apples and pears, and attacks certain ornamentals. Notes are given on its control with paraffin oil emulsions, tar oils, and nicotine-soap washes.
550. LARSEN, V. 634.13-2.653
 Sten i Pærer. (**Insect injury to pears in Denmark.**)
Dansk Frugtavl, 1939, No. 6, pp. 543-5.
 Notes on pre-blossom spraying of pears with nicotine sulphate for the control of *Pentatoma rufipes* larvae, which are very susceptible at that stage. Further control measures against this and other insects in Denmark are suggested.
551. BALÁS, G. 632.654.2
 Die durch Blattmilben verursachten Pflanzenkrankheiten in Ungarn. (**The damage done by leaf mites to certain trees and shrubs in Hungary.**)
Bull. roy. Hungarian hort. Coll., 1939, 5 : 52-70, bibl. 12.
 The chief plants and mites dealt with in this article are *Aesculus*, mite *Oxypleurites carinatus* Nal. ; *Fraxinus*, mite *Phyllocoptes epiphyllus* Nal. and *Tegonotus collaris* Nal. ; *Juglans regia*, mite *Phyllocoptes unguiculatus* Nal. ; *Malus* and *Pirus*, mite *Phyllocoptes schlechiendali* Nal. ; *Populus*, mite uncertain ; *Prunus*, mite *Phyllocoptes fockeui* Nal. et Trt. ; *Syringa*, mite *Phyllocoptes massalongoi* Nal. ; *Tilia*, mite *Phyllocoptes ballei* Nal. ; *Vitis vinifera*, mite *Epitrimerus vitis* Nal.
552. CHEK, G. 634.8-2.752
 On the control of ***Pseudococcus citri* Risso** on vines in Azerbaijan.
 [Russian.]
Plant Prot. Leningr., 1939, No. 1 (20), pp. 58-9, bibl. 3.
 In Azerbaijan *Pseudococcus citri* Risso is a serious pest of vines. The attempts to control it biologically by *Cryptolaemus montrouzieri* L. made in 1934-5 failed, nor was spraying with paraffin oil emulsions any more successful. However, HCN tent fumigation, carried out in September and October 1937 at Kirov-Abad, gave very satisfactory results, which are here tabulated. Since most of the vines in Azerbaijan are grown on trellis tent fumigation should present little difficulty.
553. DICKER, G. H. L. 634.71-2.753
 The biology of the ***Rubus* aphides.**
J. Pomol., 1940, 18 : 1-33, bibl. 23.
 After a brief historical introduction the author describes his observations made at East Malling on the biology of the following aphides. *Macrosiphum rubiellum* Theo., which he considers might well be called the blackberry aphid ; *M. rubifolium* Theo., a much less common species ; *Amphorophora rubi* Kalt. ; and *Aphis idaei* Van der Goot. Shorter notes are given on 7 other species observed or recorded in Great Britain. The fluctuation in aphid populations is discussed. The host plants of the different aphides are noted and it is found that there is often a close correlation between the genetic constitution of the host and the species of aphid breeding on it.

In an appendix brief notes are given on the origin of the following cultivated forms of *Rubus* :—Loganberry, Phenomenal berry, Laxtonberry, Youngberry, Bedford Giant, John Innes blackberry, Piper's Wilding, Himalaya and Black Diamond blackberries.

554. WIESMANN, R. 632.753 : 632.96 : 632.951.8
Wird der Blutlausparasit, *Aphelinus mali*, durch die Winterbespritzung mit Obstbaumkarbolineum geschädigt? (Does spraying with winter tar oils affect *Aphelinus mali*, the parasite of *Eriosoma lanigerum*?)
Schweiz. Z. Obst- u. Weinb., 1939, 48 : 196-8.

In Switzerland 5% anthracene oil is commonly used for winter spraying. Recent experiments in the field showed that despite its highly toxic effect on the eggs of *Eriosoma lanigerum* (100% kill), this tar oil was not dangerous to its parasite *Aphelinus mali*.

555. ANON. 632.753 : 634.1/8
Les pucerons des arbres fruitiers. (Fruit tree aphides.)
Memento Déf. Vég. Rabat, 9, 1939, pp. 13.

556. ANON. 632.76 : 634.8
L'altise de la vigne. (*Haltica ampelophaga* Guer. on vines.)
Memento Déf. Vég. Rabat, 49, 1939, pp. 9.

Life history and habits of this insect attacking the buds and leaves of vines in Morocco are described. Control measures are discussed at some length.

557. MUGGERIDGE, J. 634.75-2.76
A maize and strawberry pest (*Clivina rugithorax* Putz.).
N.Z. J. Sci. Tech., 1939, 21 : 184A-6A, bibl. 5.

A first note on damage done by the carabid beetle, *Clivina rugithorax*, to maize seed and strawberry fruits. The remedy suggested in strawberry beds is trapping in tins sunk to ground level. The beetles fall into these and fail to get out.

558. KIRCHNER, H. A. 632.76 : 634.75
Laufkäferschaden an Erdbeeren. (Strawberry beetles.)
Z. PflKrankh., 1939, 49 : 267-71, bibl. 5.

This is a study of the habits of *Carabus auratus* L., *C. cancellatus* Illig, *Pseudophonus* (*Harpalus*) *pubescens* Müll., *Ps.* (*Harpalus*) *griseus* Panz., *Omasus* (*Pterostichus*) *vulgaris* L., *Anisodactylus* *binotatus* F. and *Poecilus cupreus* L., with notes on their control by trapping in jars on strawberry plantations.

559. BAKER, A. C. 632.97 : 632.772 : 634.1/7
The basis for treatment of products where fruit flies are involved as a condition for entry into United States.
Circ. U.S. Dep. Agric. 551, 1939, pp. 8.

This is a study of refrigeration and vapour-heat methods of sterilization of fruits and kamani nuts (*Terminalia Catappa*). Recommendations as to temperatures and exposures are given. These are not based on complete mortality of the larvae, but on "a specific level of security" or some 99.99% mortality.

560. MCPHAIL, M. 632.772 : 634.1/7
Protein lures for fruitflies.
J. econ. Ent., 1939, 32 : 758-61, bibl. 3.

The following proteins in the presence of sodium hydroxide solution made very satisfactory lures for the Central American fruitfly (*Anastrepha striata* Schiner) :—casein, gelatin, filter-press, mud, baker's yeast, cow hide with hair, cow blood, white of egg, wheat shorts.

561. BOBB, M. L. 634.1/2-2.78-2.96

Parasites of the oriental fruit moth in Virginia.

J. econ. Ent., 1939, 32 : 605-7.

Of ten species of parasites reared from oriental fruit moth larvae (*Grapholitha molesta* Busch) collected in Virginia in 1937 and 1938 *Macrocentrus ancylivorus* Roh. was by far the most important.

562. LAMERSON, P. G., AND PARKER, R. L. 632.78 : 634.75

Control of the American strawberry leaf roller, *Ancyliis fragariae*, in the Lower Missouri river valley.

J. econ. Ent., 1939, 32 : 824-8, bibl. 1.

Tests in 1938 indicate that nicotine sulphate, 40% or 50% free nicotine, in combination with summer oil emulsion was the most effective insecticide for the strawberry leaf roller when applied in the interval between the hatching of the first larvae and the first rolled leaves. In the following period lead arsenate or cryolite sprays were nearly as effective, and when the leaves were rolled a strong pyrethrum powder (0.8%) was very effective.

563. MEIER, N. F. 632.78 : 632.96

Methods of mass production of *Trichogramma evanescens* Westw. [Russian.]

Bull. Plant Prot. Leningr., 1939, No. 1 (20), pp. 73-6, bibl. 12.

TELENGA, N. A. 632.78 : 632.96

Testing *Trichogramma evanescens* Westw. for the control of *Laspeyresia funebrana* Tr. [Russian.]

Bull. Plant Prot. Leningr., 1939, No. 1 (20), pp. 77-8.

SNAPP, O. I. 634.25-2.78

Further studies with ethylene dichloride emulsion for the control of the peach borer (*Conopia exitiosa* Say.).

J. econ. Ent., 1939, 32 : 683-5, bibl. 1.

564. ANON. 632.796

La fourmi des jardins, *Tapinoma simrothi* Emery. (The garden ant.)

Memento Déf. Vég. Rabat, 34, 1939, pp. 11.

Control measures against the small black ant, which is regarded as a pest in Morocco, consist of the use of insecticides and poisoned baits. Illustrations are given of different kinds of trap.

565. METALNIKOF, S. 632.7 : 632.96 : 632.3

Utilization des méthodes bactériologiques dans la lutte contre les insectes nuisibles. (Bacterial warfare against insects.)

Progr. agric. vitic., 1940, 113 : 205-8.

The author—who gives away no secrets—claims to have achieved almost complete control of the vine pyralis moth by spraying the vines with water containing bacterial spores. The spores are the germs of a deadly insect disease which is contracted by contact. Results in Champagne, Burgundy, Bordeaux, the South of France and Algiers have all been similar, namely the almost complete elimination of the insect and greatly increased crops. The spores are not dangerous to human beings or animals nor, alas, to other non-lepidopterous insects. The author states that he is working on similar preparations for other insects.

566. ANON. 632.95 : 634.1/7

Dansk Frugtavl's Sommersprøjteplan for Erhvervs- og Lille-Frugtavl. (Summer spraying programme for Denmark.)

Dansk Frugtavl, 1940, No. 4, pp. 815-25.

The programme provides for four, or if necessary five, sprays for apples and pears, three for plums, two for sour and one for sweet cherries. Walnuts get one and hazel nuts two. There

are also detailed instructions for treatment of gooseberries, currants, and raspberries. Notes appear on the preparation of the commercial products for use as sprays and washes.

567. MARTIN, H. 632.951 + 632.952

The incorporation of direct with protective insecticides and fungicides. IV.

The evaluation of the wetting and spreading properties of spray fluids.

J. Pomol., 1940, **18** : 34-51, bibl. 11.

1. The purpose of the investigation was to devise a laboratory method suitable for the assessment of the wetting and spreading properties of spray fluids. 2. Twenty different water-soluble products of potential value as spray spreaders, all containing active constituents of long-chain structure, were examined, and analytical data are given. 3. The surface tension of solutions of these products, the area of spread of droplets of constant volume, and the contact angles and retentions on standard surfaces are recorded. 4. It is shown that many surface-active substances yield solutions exhibiting advancing and receding contact angles in similar linear relationship, provided that the receding angle has a finite value. The existence of important exceptions to the rule is justification for considering the receding and advancing angle as distinct entities, though intermediate values are to be expected in spray practice. 5. The area of spread of droplets on a particular surface is related to functions both of the contact angle and of the spreading coefficient on that surface. Correlations of similar significance result when either advancing or equilibrium contact angle is used in these functions. Experimental difficulties with small droplets and uncertainty of the contact angles assumed by larger droplets render the assessment of area of spread of doubtful value in assessing wetting and spreading properties. 6. The maximum initial retention is determined by contact angle and by spreading coefficient; correlations of similar degrees of significance are obtained when either receding contact angle or equilibrium contact angle are used in the estimation of the correlation coefficients. 7. The relationships between area of spread, or maximum initial retention, and contact angles, or spreading coefficient, exist not only for surface-active compounds of similar structure, but also for spreaders of diverse molecular structure. 8. It is shown that among commercial products based on sodium dodecyl sulphate, the content of alkyl sulphate determined by analysis is an unreliable guide to the spray performance of the product. 9. Evidence is given that the estimation of maximum initial retention, and observation of the character of the spray deposit, are criteria for the evaluation of spray spreaders, but that the method is also suitable for the examination of the wetting and spreading properties of multiphase sprays and for the routine standardization of the wetting and spreading properties of compounded products. [Author's summary.]

568. EBELING, W. 632.95

The rôle of surface tension and contact angle in the performance of spray liquids.

Hilgardia, 1939, **12** : 665-98, bibl. 22.

569. CORNU, C. 632.952.21

Composés cupriques nouveaux (permutites etc.). (**New copper compounds.**)

Progr. agric. vitic., 1940, **113** : 269-72.

This is the first practical experiment of forming copper compounds directly on the foliage by spraying with two different solutions through a new two-jet Mycol apparatus (Type Bary-Cornu, made by the firm Vermorel). This promises the use of a number of copper compounds which hitherto could not be used.

570. ZUBOV, M. F. 632.951/2

The toxic efficiency of solbar as insecticide and fungicide. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1940, No. 1, pp. 30-5.

Field and laboratory insecticidal and fungicidal tests were made by the NIUIF* of the U.S.S.R. Institute of Plant Industry on barium polysulphide (solbar). The results of the trials,

* Scientific research institute for fertilizers, insecticides and fungicides. [NIUIF.]

which were conducted for several years with a great number of different plants are tabulated. The conclusions may be summed up as follows: Solbar can be recommended for use against mildew and mite of cucumber, against mite of hops, against citrus mite, brown spot of tomatoes, mildew of ornamentals, red spider on apples, and strawberry mildew. It appears to have some scope as an insecticide and fungicide for cotton, tau-saghyz, apple (scab), pears and vines. Its advantages as an insecticide over the analogous lime polysulphide (preparation ISO) are pointed out. All enquiries concerning preparation and uses of solbar may be directed to NIUIF, Moscow, Kaluzhskoye Chaussee, No. 61, Phytopathologic Laboratory.

571. NOTINI, G. 632.951.23 : 638.12
Studier over arsenikpudermedlens inverkan på bin. (**Effect of arsenical powders on bees.**)
Meddel. Stat. Våxtskyddanst 30, 1939, pp. 12, bibl. 34.

Experiments conducted in Sweden by the Statens Våxtskyddanstalt showed that arsenic dusts were more dangerous to bees than arsenic sprays. Wet poison killed the working bee almost immediately on its contact with the sensitive organs and body of the insect, but arsenic in dust form could be carried by the bee into the hive and there poison the young bees.

572. DUSTMAN, R. B., AND DUNCAN, I. J. 634.11-2.95
Effect of certain thiocyanate sprays on foliage and fruit in apples.
Plant Physiol., 1940, 15 : 343-8, bibl. 6.

Results of trials made at the West Virginia Agricultural Experiment Station are summarized as follows:—It has been found that soluble thiocyanates, particularly inorganic thiocyanates, used as a spray on apples during the growing season, exert a pronounced physiological effect on both foliage and fruit as follows:—In the foliage the leaves are subjected to spray burn and to a chlorotic condition arising from the effect of the chemical on the green colouring matter of the plant. In the fruit the amount of red colour occurring normally tends to be increased and the green ground-colour tends to be reduced or replaced by varying shades of yellow and yellow green.

573. FAHEY, J. E., RUSK, H. W., STEINER, L. F., AND SAZAMA, R. F. 634.11-2.951.23
Ease of residue removal from late and early spray applications of lead arsenate to apples.
J. econ. Ent., 1939, 32 : 714-7, bibl. 2.

Experiments made in Indiana in 1935, 1936 and 1937 indicate that the residue load at harvest from a given number of lead arsenate sprays increases as the time of spray application approaches harvest time, thus a final cover spray may leave at harvest a residue equal to that resulting from 4 first brood sprays. The use of oil adhesives with organic insecticides, as in second brood sprays in Indiana, makes the residue of lead arsenate from first brood sprays as difficult to remove as are residues from lead arsenates used throughout the season.

574. MAIER, W. 632.952 : 634.1/2
Die fungizid wirksamen Kupfermengen bei der Blauspritzung der Obstbäume.
(**The fungicidal properties of early copper-lime washes.**)
Z. pflKrankh., 1939, 49 : 160-76, bibl. 24.

In trials at Geisenheim rain water from bordeaux-sprayed pear trees was several times analysed for copper. The copper content was considerably higher in rain water soon after spraying and fell with each subsequent rainfall. The loss of copper varied according to the method of training the trees. The rain water collected from under the sprayed trees prevented the germination and growth of the conidia of pear scab (*Fusicladium pirinum*). It was shown that early bordeaux sprays have a different fungicidal action to that of late sprays. The copper found in the rain

water indicated that the concentrations were sufficiently strong to prevent infection, both prior to and during blossoming, but were not strong enough to check the incidence of scab at a later date.

575. CLARKE, G. H. 632.51
Important weeds of South Australia II.*

Bull. Dep. Agric. S. Aust., 343, 1939, pp. 52, bibl. 7.

The following weeds are here considered :—*Euphorbia Drummondii* Boiss, *Euphorbia terracina* L., *Marrubium vulgare* L., *Asclepias rotundifolia* Mill., *Asclepias fruticosa* L., *Carduus tenuiflorus* Curtis, *Homeria miniata* Sweet, *Homeria collina* Vent., var. *aurantiaca* Sweet, *Brassica tournefortii* Gouan, and *Rapistrum rugosum* All. The coloured illustrations are useful.

576. SPAFFORD, W. J. 632.51 : 627.1
Water hyacinth in South Australia.

Bull. Dep. Agric. S. Aust., 345, 1939, pp. 4, being *Suppl. J. Agric. S. Aust.*, June, 1939.

The rapidity with which the water hyacinth (*Eichornia speciosa*) has multiplied during 18 months in the Lower Murray Basin of South Australia causes serious concern. Immediate eradication is urged. The only method of doing this likely to succeed is to pull the plants out of the water on to dry land, where after drying they should be burned.

577. WEEDS SECTION, DEPARTMENT OF AGRICULTURE AND FORESTRY, S.AFRICA,
AND PHILLIPS, E. P. 632.51
Opuntias in South Africa.

Fmg S. Afr., 1940, 15 : 119-28.

The first part of the article is concerned with the 14 species of *Opuntia* recorded in S. Africa and in particular the six which are most widely spread and the worst as pests. These are *Opuntia megacantha*, *O. vulgaris*, *O. aurantiaca*, *O. imbricata*, *O. tardiospina*, and *O. spinulifera*. Methods of chemical and biological eradication are discussed at length for prickly pear and jointed cactus and of combined chemical and mechanical eradication for imbricate cactus. In the second part Dr. Phillips gives a description with coloured plates of 8 varieties of *Opuntia*.

578. HURD-KARRER, A. M. 632.954
Comparative susceptibility of crop plants to sodium chlorate injury.

Tech. Bull. U.S. Dep. Agric. 648, 1940, pp. 15, bibl. 20.

In greenhouse tests conducted by the United States Department of Agriculture susceptibility of various crops to sodium chlorate injury was studied. The comparisons were based on green weights of the injured plants, expressed as percentages of the weights of equal numbers of control plants. Among the more sensitive plants were sunflower and spinach, while flax was among the most tolerant. Soybean, though appearing resistant in early growth stages, invariably failed later in striking degree. Chlorate injury was greater at low temperature (10° to 15°C.) than at high temperature (20° to 25°C.). This tendency was more pronounced with some crops than with others.

VEGETABLE GROWING.

579. KAMINSKY, S. 635.1/7 : 631.548
Trials on methods of watering vegetables in the Buriat Mongolian A.S.S.R.

[Russian.]

Vegetable Growing, Moscow, 1940, No. 1, pp. 21-5.

In 1936-8 irrigation trials in Buriat-Mongolia plants could be divided into three groups, each of which responded differently to a particular method of irrigation. Treatments are suggested for

* For I see Important weeds of South Australia I. Reprinted as *Bull. Dep. Agric. S. Aust.*, 313, 1936, pp. 90.

(a) seedbed plants such as tomato, (b) trailing plants such as cucumber, and (c) others including beet, turnips and carrots.

580. TIMOSHENKO, S. V. 635.1/7 : 631.548
Overhead watering of vegetables in the Moscow district. [Russian.]
Vegetable Growing, Moscow, 1940, No. 1, pp. 14-7.

In a number of districts around Moscow, where the average yearly rainfall is low, watering significantly increased vegetable yields. On many collective farms a KDU overhead watering plant proved highly efficient.

581. COOK, R. L. 631.544 : 631.42 : 631.3
A mixer and sampler for greenhouse soils.
J. Amer. Soc. Agron., 1939, 31 : 171-4.

The author describes with the aid of an illustration a mechanical mixer and sampler for greenhouse soils. This was constructed and has been used for two years in the soils greenhouse of the Michigan Agricultural Station. It enables one to mix intimately a small quantity of fertilizer with, say, 4-10 kg. soil or obtain a true, small sample of an entire pot of soil.

582. BOIS, E. J. 631.8 : 631.544
Le thermo-fertyl, un nouveau produit pour l'horticole. (Thermo-fertyl, a new horticultural product.)
Rev. hort. suisse, 1940, 13 : 62-3.

Thermo-fertyl is an inexpensive proprietary substance for generating and maintaining heat by fermentation in hot beds. The beds can be made of dead leaves, litter or chopped straw. In the experiments described heat was maintained under cold frames throughout the winter when the control heaps, also under glass, were frozen hard. The substance proved superior in heat maintenance to all other products designed for the same purpose. The plants propagated in the hotbeds, including *Coleus* which is exceptionally sensitive to toxic gases, suffered no ill effects from any emanations and formed exceptionally vigorous root systems. The spent beds form a very fertile humus.

583. MKRTCHIAN, V. S., AND GRIEKO, N. P. 635.1/7 : 631.544
Mechanized frames in Russia. [Russian.]
Vegetable Growing, Moscow, 1939, No. 12, pp. 15-21.

In Russia where much of the vegetable supply is grown under glass, mostly in the so-called "Russian" frames, requiring much labour, mechanization has become imperative. A type of frame has been developed by the first named author and subjected to tests for three years under normal production conditions at the Gorky State farm. The results were very satisfactory. In the present article notes appear on the lay-out of plots, planning and construction of frames, water supply, electricity and temperature. The most interesting feature is that the whole work is done by an electrically driven appliance which runs along the frame rows opening the lights en route and shutting them after it has passed. This appliance in the course of its passage down the frame rows can perform no less than 22 cultural operations, either by itself or, in such cases as pricking out, while carrying an operator.

584. GREENSTEIN, E. J. 635.1/7 : 631.8
Fertilizer problems in vegetable production.
Fmg S. Afr., 1940, 15 : 101-3, bibl. 5.

The author discusses the general principles governing the manuring of vegetables and gives extracts from the papers presented at the 12th International Horticultural Conference, Berlin, 1938, on vegetable growing in different temperate zone countries. The experiences of these

countries indicates that, if fertilizers are given, they should only supplement or be a partial substitute for organic manures. They are found useful for forcing. Notes on manurial experimental results with tomatoes in S. Africa, cauliflowers in France and Germany and late potatoes in U.S.A. are also given.

585. MACVICAR, R. M., AND NOWOSAD, F. S. 633.416+633.63

The production of mangel and sugar beet seed.

Circ. Dep. Agric. Canada, 154, 1939, pp. 4, being *Publ.* 679.

NOWOSAD, F. S., AND MACVICAR, R. M.

635.126

The production of swede turnip seed.

Circ. Dep. Agric. Canada, 155, 1939, pp. 4, being *Publ.* 680.

In the first circular the main points in raising mangel and sugar beet seed in Canada are discussed under the following heads:—Varieties, growing, harvesting and over-wintering the seed roots; planting seed roots for seed, care of the seed crop, harvesting, threshing, cleaning and seed storage. The second circular deals similarly with swede turnip seed production.

586. VENTRESS, E. W. S. 633.491-1.57

The potato and its products—farina, dextrine and glucose.

Chemistry and Industry, 1939, 58: 1069-70.

A plea for the utilization of waste potatoes by the extraction of farina and its derivatives, dextrine and glucose. It may be noted that farina, or starch, is much used not only in the confectionery trade, but also in the treatment of yarns and woven fabrics in the textile trade. Dextrine is also used in this trade and its use as an adhesive in the manufacture of cartons is increasing. Glucose is used in the manufacture of various foodstuffs.

587. CHEVALIER, A. 589.514

Les espèces de *Solanum* cultivées venues du Nouveau-Monde. (**Cultivated**

***Solanum* species from the New World.**)

Rev. Bot. appl., 1939, 19: 825-35, bibl. 4.

A short review of the origins and results of cultivation of a number of *Solanaceae* from the New World. Potatoes, tomatoes, aubergines and others less well known are dealt with.

588. ANON. 632.41: 635.1/7

Le mildiou des composées. (**Mildew caused by *Bremia Lactucae* Regel.**)

Memento Déf. Vég. Rabat, 44, 1939, pp. 7.

A description is given of the organism (*Bremia Lactucae* Regel) and the symptoms and spread of this disease of the *Compositae*, which is particularly prevalent in artichokes, cardon, endive and lettuce. The nature and extent of damage are noted and control measures are discussed in some detail.

589. PALILOV, N. I. 635.262

Experiments with garlic. [Russian.]

Vegetable Growing, Moscow, 1939, No. 10-11, pp. 37-40.

GONCHARENKO, F. I.

635.262

The latest in the chemistry of garlic. [Russian.]

Vegetable Growing, Moscow, 1939, No. 10-11, p. 40.

In the first of these articles an account is given of the cultivation and storage of this fragrant bulb. In the second its chemistry is discussed. Raw garlic is found to contain 21.93% fructose (dry weight). Its vitamin C content is high.

590. BANGA, O. 635.52
Bijdrage tot het rassenonderzoek van kropsla. (**Contribution to the study of cabbage lettuce.**)

Meded. TwintvoorlichtDienst., 14, 1939, pp. 102, bibl. 22, fl. 0.30.

The results are reported of an early planting in an unheated greenhouse in spring and an out-of-door sowing in summer of 40 varieties of cabbage lettuce in Holland. Differences in viability and heading capacity, in length of growth phases and in morphology are shown. Dutch varieties predominate though a few English are included. The lettuces were received under 68 names of which 28 proved to be synonyms.

591. GOIDÀNICH, G. 635.52 : 632.42
Il marciume dell'insalata causato da *Sclerotinia minor* Jagg. (**A lettuce rot caused by *S. minor*.**)
Boll. Staz. Pat. veg. Roma, 1939, 19 : 293-334, bibl. 16.

Control measures against this serious rot of lettuce consist of the observance of certain cultural practices and of soil sterilization by chemicals or heat. Among chemicals which have been successful are uspulun, acetic acid, formalin. The efficacy of formalin against the sclerotia of *S. minor* has been confirmed by the author.

592. OUNSWORTH, L. F. 635.53 : 631.8
Greenhouse fertilizer studies of celery.
Sci. Agric., 1940, 20 : 329-41, bibl. 11.

The author summarizes his interesting results with celery investigations at the Macdonald College, Quebec as follows:—Plants were grown in quartz sand and fed weekly with nutrient solutions. The results indicated that the equivalent of one ton per acre of 4-8-16 fertilizer mixture gave the best results. Root systems were affected by the deficiencies of nitrogen, phosphorus and potash, being small and brownish. Potash deficiency tended to produce poorly developed root systems with few rootlets. Phosphorus was the limiting factor on muck soil in the greenhouse, while additions of nitrogen and potash to mineral soils adversely affected growth. In many instances increasing phosphorus beyond a certain limit had a detrimental effect on growth. In some of the studies, an increase of potash did not improve the yield or quality, but it had no detrimental effect on growth, except when it was applied to the mineral soil plots in the greenhouse. A proper balance of nitrogen, phosphorus and potash is required to give the best results. This balance can be ascertained only by trial on the different types of soil and under the different climatic conditions which are likely to exist from year to year.

593. SCHULTZ, H. 635.41 : 632.4
Blattschäden an Spinat durch *Colletotrichum Spinaciae* Ell. et Halst. (**Spinach disease caused by *Colletotrichum Spinaciae*.**)
Zbl. Bakt., Abt. II, 1939, 101 : 225-32, bibl. 5.

All spinach varieties used in infection trials at Grossbeeren were equally susceptible to the leaf spot disease, caused by *Colletotrichum Spinaciae*.

594. BABB, M. F., AND KRAUS, J. E. 635.43
Orach, its culture and use as a greens crop in the Great Plains region.
Circ. U.S. Dep. Agric. 526, 1939, pp. 22, bibl. 35.

The main points in the cultivation of orach (*Atriplex hortensis* L.) are here discussed. It is grown in the central area of the Great Plains as a substitute for spinach. Its great value is to furnish a green vegetable after spinach has bolted to seed. The following aspects are examined: varieties, climatic and soil requirements, planting, seed types and germination, thinning, harvesting, yields, uses, pests and diseases, sources and production of seed.

595. ARMSTRONG, S. F. 635.54 : 633.73

Trials of chicory strains, 1936-1938.

J. nat. Inst. agric. Bot., 1939, 4 : 360-71.

The coffee chicory, *Cichorium Intybus* L. var. *sativus*, is an easy crop to grow and is relatively free from attacks of pests and diseases. It is immune to the sugar beet eelworm, *Heterodera schachtii* Schmidt, and as it occupies the same place in the rotation as sugar beet, it offers an ideal substitute for that crop where land is infested with eelworm. The results of 3 years' trials on 6 strains are here recorded as regards yields and dry matter content.

596. KREVCHEKOV, L. E. 635.61/2 : 631.52

Selection among melons and gourds. [Russian.]

Vegetable Growing, Moscow, 1939, No. 12, pp. 30-4.

The chief results of the work, which was started at the Biryuchekut Station of the U.S.S.R. Institute of Plant Industry in 1925, may be summed up as follows:—*Water-melons*. Two high-yielding varieties with fine quality fruits were obtained by crossing King of Cuba with Korea. It may be noted that the former variety is a good cropper and the latter a very poor one. On the other hand the flavour of Korea fruits is particularly fine. *Melons*. By crossing local forms (Rostov, Krasnodar) with the famous *Chardjui* melons coming from Asia, hybrids were produced which, unlike *Chardjui*, showed no signs of anthracnose. *Pumpkins*. High sugar content and not merely weight of fruit is the main object in breeding. The study of cultural methods suggests certain improvements such as "bush" cultivation of a new hybrid melon variety. The set was better when, by means of paper bags lined with moist cotton-wool, higher humidity was maintained around the flowers at flowering time. Out of 374 untreated flowers only 32 (8.5%) set fruit, while of the 344 flowers with moist cotton-wool 129 flowers set fruit (37.8%). Perhaps more important than the actual results is the work which is going on with selected hybrids for further trials.

597. REPIN, A. N., AND TISHKOV, S. I. 631.531 : 635.61/63

The effect on yield of special seed treatments of water melons, melons and cucumbers. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1939, No. 21-2, pp. 17-20, bibl. 6.

In Ukrainian trials, in which selected cucumber, water melon and melon seed, showing a germinating capacity of 95% and 7% moisture content, was used, higher yields and higher average weight of fruits were obtained when the seed was first subjected to certain treatments. *Cucumber* seed was soaked in water for 4 to 6 hours until its moisture content was 25.3%. Thereupon it was dried in 2 half-hourly treatments at 70° C., so that the seed itself was not heated to over 45° C. The yield increased by 17.2%. *Water melons* produced the highest yields (by 35.3%) when after soaking for 4-6 hours (to 38.5% moisture content) the seed was dried for two hours at a temperature of 60° C. during which it reached a temperature of 37° C. Good results were also obtained by drying unmoistened seed at 40° C. for 4 hours or at 50° C. for 2 hours. *Melon* yields were some 20% higher when dry seed was treated at 60° C. for 1 hour or 40° C. for 4 hours.

598. ANON. 635.61

Watermelon and sweet melon cultivation in Palestine.

Agric. Suppl. Palestine Gaz. 39, 1939, pp. 52-5.

HUFFORD, G. N.

635.615

Development and structure of the watermelon seedling.

Bot. gaz., 1938, 100 : 100-22, bibl. 12.

ANON.

632.753 : 635.1/7

Les pucerons des plantes maraichères. (Aphides of market garden plants.)

Memento Déf. Vég. Rabat, 57, 1939, pp. 11.

599. KHAEV, M. K. 635.581 : 612.014.44

What a vegetable grower wants to know. [Russian.]

Vegetable Growing, Moscow, 1940, No. 1, pp. 4-6.

A more detailed knowledge is required of photoperiodism. This is underlined by a brief description of an experiment in Russia with Klinsky cucumbers which grew better at short day light (12-hour day) than under natural (long day) conditions. Similar experiments at the Maikop Research Station of the Institute of Plant Industry showed that Muromsky and Nez-hinsky cucumbers developed and yielded best when subjected to 12-hour day light, whereas a 9½-hour day was the most favourable for the Klinsky variety.

600. FREEMAN, H. J. 635.64

Tomato culture in Queensland.

Qd Agric. J., 1939, 52 : 662-77.

An account of modern methods of growing tomatoes commercially in Queensland.

601. SILVA, R. F. E. 635.64

A cultura do tomateiro no Brasil. (**Tomato growing in Brazil.**)

Bull. Minist. Agric. Brazil, 1939 (unnumbered), pp. 17, bibl. 8.

An account of the field cultivation of tomatoes in Brazil. A list of varieties which seem suited to the conditions is given.

602. FLEMING, W. M., AND ATKINSON, F. E. 664.64.65.036.5

A scoring system for canning tomatoes.

Sci. Agric., 1940, 20 : 317-20.

A system is described and discussed for evaluating the merits of tomatoes grown for canning. 50 marks (for 6 characters) are allotted for cultural characteristics and 50 marks (for 8 characters) for canning characteristics.

603. WOODS, J. J. 635.64

Spacing staked tomatoes.

Sci. Agric., 1940, 20 : 313-6, bibl. 5.

The results of spacing staked Bonny Best tomatoes on the Dominion Experimental Farm, Agassiz, B.C., in the years 1935-8 are set out in this article. The plots were replicated each year four times in a latin square. Four distances of planting were involved in rows 15 ft. long and 3 ft. apart. The spacing was at 12 in., 18 in., 24 in. and 30 in. A consistently higher yield was got from the 12 in. spacing and this is therefore recommended. The figures of the average yearly yield per plant did not show so marked a trend and it is assumed, therefore, that close planting decreases to only a very limited extent the yield of individual plants. The same holds good as regards spacing and number of fruits per plant, spacing and percentage of culls, and spacing and average size of fruit, there being no marked consistent tendency indicating definite influence of spacing on these characters.

604. ROMASHENKOV, D. D. 635.64 : 612.014.44

Increased tomato yields due to additional lighting of the seedlings. [Russian.]

Vegetable Growing, Moscow, 1939, No. 2-3, pp. 15-8.

Photosynthetic experiments with tomatoes carried out in 1938 on 3 State farms and 1 collective farm in the Leningrad area led to the following conclusions :—1. Additional lighting (4 hours per day) given to tomato seedlings in the field, hotbed and glasshouse resulted in 13-35% yield increase. 2. The effect was particularly marked in hotbed plants. 3. The fruits on plants that had enjoyed additional lighting ripened 2-16 days earlier. It may be added that the temperature of the air above the experimental hotbeds was 2-2·3° C. higher than that above the control beds.

605. OSNITSKAYA, E. A.

635.64 : 632.3

Bacterial canker of tomatoes and its control. [Russian.]*Vegetable Growing*, Moscow, 1939, No. 2-3, pp. 38-42.

Control of bacterial canker of tomatoes, *Aplanobacter michiganense*, consists of seed disinfection and hygiene. For disinfection the seed is treated for 5 minutes in a corrosive sublimate water solution (1 g. per 3 litres of warm water). It should then be carefully washed. When the seed is sown on the same day, it need only be dried slightly in the sun. Otherwise it should be dried thoroughly. Corrosive sublimate proved a highly effective disinfectant, but its poisonous properties make its use undesirable. Hence, various other disinfectants are being tested by the Institute of Vegetable Growing. Zbarsky's bactericide and higher formalin concentrations showed promise. Infected material should be burnt and soil made sterile by (a) steam (100° C. for 30 minutes); (b) chloropicrin (60 g. per square metre); (c) dusting infected earth with calcium chloride. The last method has the slight disadvantage that the earth may not be used for three years [!—ED.]. Frames and hotbeds from which the infected earth have been removed must be disinfected with 10% calcium chloride solution; (d) Seedbeds and frames where no previous infection occurred may be fumigated with sulphur (30-35 g. per cubic metre) or gas-disinfected for 24 hours with 10% formalin solution. Spread of the disease by handling the plants under experimental conditions could be avoided by disinfecting the hands with crude alcohol. Judging from the results of the Gribov station, where much work has been done during the last two years, there is little hope of getting immune plants by crossing tomatoes with wild *Lycopersicum* species, since none of those tested proved immune in artificial infection trials. *L. pimpinellifolium* and its hybrid from the cross with tomato var. Bison showed a high degree of resistance.

606. CURTIS, K. M.

635.64 : 632.48

Control of tomato leaf-mould : the value of different sprays.*N.Z. J. Sci. Tech.*, 1939, 21 : 187A-92A, bibl. 7.

Of some 10 sprays tested in a Nelson glasshouse in 1938-9 against leaf-mould of tomato (*Cladosporium fulvum* Cke.), Shirlan, W. S.* and Shirlan, A. G. gave the best commercial results, having no harmful effects on fruit set, fruit quality or foliage texture. They resulted moreover in increased yields.

607. ORTH, H.

635.64 : 632.4

Untersuchungen über die Biologie und Bekämpfung des Erregers der Stengelfäule der Tomate (*Didymella Lycopersici* Kleb.). (Stem rot of tomatoes, caused by *Didymella Lycopersici* Kleb.)

Zbl. Bakt., Abt. II, 1939, 100 : 211-44, bibl. 14.

German field observations showed that stem rot infection in tomatoes comes chiefly from the soil. Old plants were found to be more susceptible than young ones. Embryos were normally not attacked by the fungus. As a rule stem rot became first noticeable after transplanting to the field. Diseased seed rarely developed diseased plants, but its germinating capacity was somewhat lower. Of the control measures in the field the only successful one was watering with 0.1% sublimate solution and disinfection of the stakes with 1% formaldehyde. Heavy soils receiving large dressings of fresh organic manure favoured the saprophytic development of the fungus and made the plants more susceptible to disease. Of some 100 cultivated varieties tested none was immune.

608. DIMMOCK, F.

635.655

Soybeans.

Fmrs' Bull. Dep. Agric. Canada, 80, being Publication 660 or Revision Pamphlet 155, pp. 20.

The soya bean is comparatively new as a farm crop in Canada. In this bulletin the author gives a description of the plant, its soil and climatic requirements and the uses of its seed, which

* There are indications that leaf damage may be caused by Shirlan, W.S. used in this connexion as a power spray.

are very numerous. As the result of tests 8 varieties show promise for Canadian conditions. Recorded seed production varies considerably in different places and figures are given of returns from different parts of Canada. The adaptation of different varieties to different environments is marked. Brief notes are given of cultural operations and of storage and marketing.

609. LAUGHLAND, J., AND LAUGHLAND, D. H. 635.655

The effect of age on the vitality of soybean seed.

Sci. Agric., 1939, 20 : 236-7.

Soya bean seed is deceptive in appearance. Failing a knowledge of its age, germination tests should be made. If not more than 3 years old the seed will germinate satisfactorily, but 4-year-old and older seed was not found satisfactory in Canada.

610. CHAMBERLAIN, E. E. 635.656 : 632.8

Varieties of garden and field peas immune to pea-mosaic.

N.Z. J. Sci. Tech., 1939, 21 : 178A-83A, bibl. 12.

Examination of 34 garden-pea and 22 field-pea varieties available in New Zealand shows that 12 of the former and 2 of the latter are immune to the pea-mosaic virus (*Pisum virus 2* of Smith, 1937). An attempt is being made to produce an immune variety of the popular garden type Greenfeast.

611. BOTTOMLEY, A. M., AND SMIT, B. 635.8

Intensive mushroom-growing for the amateur, and Mushroom insects and their control.

Reprinted from *Fmg S. Afr.* as *Bull. Dep. Agric. S. Afr.*, 210, 1939, pp. 34, bibl. 11.

Mushroom growing in South Africa as seen in the light of the latest English and American research and local experience. The fact that the information is offered to amateurs only is explained by the absence of commercial growers in South Africa, where this industry is entirely new. Notes are given on spawn, manure, houses ; production and marketing ; safeguarding the health of the crop ; growing for profit ; and food value. Mushroom insects and their control are briefly discussed by B. Smit in an incorporated article.

612. WEINHARDT, N. G. 635.8 : 631.8

Mineral fertilizers for cultivated mushroom. [Russian.]

Vegetable Growing, Moscow, 1940, No. 1, pp. 43-4.

The effect of nutrition on mushroom yields was studied under experimental conditions at a Moscow collective farm. The substrate consisted of horse manure containing 20% sawdust, which latter, however, was found to reduce the yields on some of the experimental plots. For casing sandy vegetable-garden soil was used, which had received liberal dressings of organic manure for several years in succession. Both pure and wild strains of fungi were used. The results may be summed up as follows:—Sulphate of ammonia (1 kg. per 1 cubic metre of substrate) gave the highest increase in yields. Sulphate of ammonia changed the slightly alkaline reaction of the soil to a slightly acid one (pH approx. 6.5) which is the best for mushroom growth. Biochemical processes in the soils resulting in heat development appear to take place more actively and more rapidly in the soils with sulphate of ammonia dressings. Watering the nutrient soils with potassium nitrate in solution during the cropping period every fortnight or three weeks did not appear to affect the yield appreciably. The effect of superphosphate (0-5 kg. per cubic metre of substrate) on cropping was not clear. Sulphate of ammonia and superphosphate (varied amounts) gave higher yields than controls only when the smallest amounts (0-5 kg. of each per cubic metre of substrate) were used. This increase in yield of mushrooms was lower than that brought about by sulphate of ammonia alone.

613. HEIGER, E. F. 633.859
Sortenkundliche Untersuchungen zur Frage der Opiumgewinnung in Deutschland. (*Varietal studies of **Papaver somniferum** L. in Germany.*)
Forschungsdienst, 1939, 8 : 508-14.
Hitherto in Germany poppies have been grown mainly for oil and their cultivation for opium production is relatively new. Most of the work has been conducted at Leipzig and at Weißenstephan. The results so far obtained lead to the following conclusions:—(1) that morphine content is essentially a hereditary factor, but that (2) it depends on soil, climate and nutrients as well as the method of production; (3) that in Germany and German-occupied territories blue seed poppy varieties give an opium with high morphine content even in seasons unfavourable to the accumulation of alkaloids in plants; (4) that the less changeable the climate, i.e. the drier and warmer it is, the higher will be the opium production.
614. YAROSLAVTSEVA, N. F. 633.859
The effect of climatic conditions on growth of poppies grown for opium.
[Russian.]
Proc. Lenin Acad. agric. Sci., Moscow, 1939, Nos. 23-24, pp. 18-22, bibl. 4.
Under Karakol research station conditions (Southern U.S.S.R.) higher temperatures, lower rainfall and lengthier periods of sunshine hastened, at the expense of leaf development, the growth and development of late opium poppies as compared with early poppies. Early poppies ripened at least 10 days earlier. Yields of opium and seed yields were significantly higher in the early poppies.
615. RAABE, A. 632.4 : 633.85
Untersuchungen über pilzparasitäre Krankheiten von Raps und Rüben.
(*Fungus diseases of **Brassica Napus** L. var. **arvensis** (Lam.) Thell. and **Brassica Rapa** L. var. **silvestris** (Lam.) Purch. et Ley.*)
Zbl. Bakt., Abt. II, 1939, 100 : 35-52, bibl. 9.
Fungi on two important German oil plants.
616. MOSKALENKO, S. S. 633.845-1.61
Reclamation of steppe lands with the aid of the caper trees. [Russian.]
Vegetable Growing, Moscow, 1940, No. 1, pp. 25-8.
Notes on morphology, pollination and propagation of *Capparis spinosa* L. growing wild in many parts of U.S.S.R., with special reference to Tajikistan conditions.
617. WESTGATE, W. A., AND RAYNOR, R. N. 632.954
A new selective spray for the control of certain weeds.
Bull. Calif. agric. Exp. Stat., 634, 1940, pp. 36.
A number of common broad-leaved annual weeds of cereals, flax, onions, alfalfa and maize were effectively controlled in the field at the California experiment station with sodium dinitro-ortho-cresylate (Sinox), which was applied as a dilute solution with hand and field sprayers or with specially equipped aeroplanes.

FLOWER GROWING.

618. MULFORD, F. L. 635.976
Care of ornamental trees and shrubs.
Fmrs' Bull. U.S. Dep. Agric., 1826, 1939, pp. 80.
An extremely useful, peace time, bulletin!

619. NESTERENKO, P. A. 633.812
Lavender. [Russian.]
Publ. (Nikita) Lenin Acad. agric. Sci., Moscow, 1939, Vol. 18, No. 2, pp. 76, bibl. 12, 2-50 roubles.
 A study conducted at the Nikita State Botanical Gardens of *Lavandula vera* D.C., *L. Spica* D.C., and hybrids of these two aromatic herbs species which are widely cultivated in the Crimea for essential oil. It includes botanical and biological descriptions. The principal points in breeding and selection are discussed.
620. JONES, H. L. 635.939.98 : 631.346
The growing of chrysanthemums and other plants in wire pots.
Welsh J. Agric., 1939, 15 : 303-5.
 Wire pots have proved at the Padeswood Hall Demonstration Centre, Flintshire, greatly superior to earthenware pots for chrysanthemums and other plants grown outside in the summer before bringing under glass to bloom. They are, moreover, considerably cheaper. The advantage of wire pots is that when plunged in the soil outside the roots are able to spread to the adjoining ground and no watering is needed. The contrary holds good with earthenware pots. Some of their numerous uses, especially in commercial horticulture, are mentioned.
621. THOMAS, H. E., AND MASSEY, L. M. 632.8 : 635.937.34
Mosaic diseases of the rose in California.
Hilgardia, 1939, 12 : 647-63, bibl. 18.
 Three distinct mosaic diseases of the rose were found in central California. The use of buds from diseased plants seems to be an important means of introducing the diseases.
622. CHULKIN, M. 633.81
Essential oil plants exhibited at Moscow in 1939-40 and in production. [Russian.]
Soviet Subtropics, 1940, No. 3 (67), pp. 21-7.
 Brief notes on Kazanlyk rose, geranium, lavender, basil, citron-scented gum, lemon-grass, jessamine, bitter orange and bergamot, cultivated in Caucasus and the Crimea. In 1939 the total area under essential oil plants in U.S.S.R. exceeded 165,000 ha.
623. SOLOVIEV, A. P., AND SHMAGRINA, O. T. 633.811
The effect of mulching on roses. [Russian.]
Soviet Subtropics, 1940, No. 3 (67), pp. 51-2.
 Experiments conducted by the Crimean research station of the U.S.S.R. Institute for essential oil industry showed that roses greatly benefit from paper mulching. The costs of paper and increased labour were insignificant as compared with the great increase in rose petal yields. The beneficial effect of mulches is explained by improvement of moisture and nutrient conditions in the soil and by the check given to weed development.
624. CHERNOVA, A. K. 633.811-2.952
Rose rust control in Russia. [Russian.]
Soviet Subtropics, 1940, No. 3 (67), pp. 48-9.
 In the course of recent investigations conducted at the Crimean research station (VIEMP)* sulphate of ammonia in the form of dust and spray was found to be a useful fungicide against the rust of pink Kazanlyk roses. As a preventive measure against rust a new preparation (MGES No. 2) was more effective than 1% bordeaux mixture. MGES No. 2 is a mineral oil derivate and contains 0.69% copper. A programme for fungicidal treatments is suggested.

* U.S.S.R. institute for essential oil industry.

625. HEPTING, G. H. 634.973.736-2.48

A vascular wilt of the mimosa tree (*Albizzia Julibrissin*).

Circ. U.S. Dep. Agric. 535, 1939, pp. 10, bibl. 67.

An epidemic disease of the mimosa tree (*Albizzia Julibrissin* Duraz.) in the U.S.S.R. and south-eastern U.S.A. appears to have been caused by a new *Fusarium* species.

CITRUS AND SUB-TROPICALS.

626. ANON. 634

Review of the year 1939.

Mon. agric. Bull. Palestine,* Jan. 1940, pp. 56-67.

A review of weather, crops, and research in Palestine in 1939. As regards horticulture it is noted that of the 6 horticultural stations closed down in the previous year that at Nablus was reopened in September 1939 and there are prospects of reopening those at Ein Arrub and Farwana. Conditions generally improved. The General Agricultural Council came to the conclusion that the increased difficulties facing the citrus industry as the result of the war restricting shipments necessitated the early establishment of a Control Board with statutory powers.

627. PASCUAL, A. 634.3

Citrus cultivation in U.S.S.R.

Int. Rev. Agric. (Mon. Bull. agric. Sci. Pract.), 1939, 30 : 45T-50T, bibl. 43.

Since 1928 the cultivation of citrus in U.S.S.R. has made rapid progress especially in Georgia. Various experiment stations are connected with this progress. On the shores of the Caspian Sea are the acclimatization experiments of Mayer dwarf lemon and mandarins. At Kyzylatrek in Turkmen, Central Asia, the acclimatization of various sorts grafted on trifoliate stock; these suffered from excess of sodium chloride in the soil. At Ivanovsk the work is chiefly to increase the northern range by selection of cold-resistant varieties. At Sukhum general acclimatization and breeding, over 500 varieties being grown, principal aims being the evolution of cold-resistant and long-keeping types. At Nikita Botanical Garden (for the present renamed Molotov) American hybrids, i.e. citrange, limequat, etc., are a main interest. At Odessa Botanical Garden the grafting of lemons is studied. The organization of citrus cultivation and experiment is centralized in the Lemon and Mandarin Cultivation Trust (Limmantrust). The author considers that although the information and statistics provided by Russian publications are often incomplete, clearly a great effort has been made to encourage an industry almost non-existent 10 years ago and great progress has been made.

628. PASCUAL, A. 634.3

Citrus in the United States.

Int. Rev. Agric. (Mon. Bull. agric. Sci. Pract.), 1939, 30 : 201T-11T, bibl. 17.

The development of citrus growing in the United States is briefly traced. The Californian industry which produces 60% of all U.S. oranges is founded on two varieties, Navel and Valencia, whereas in Florida a wider selection is grown. Picking, handling and transport are treated in some detail. Packing is entirely in the hands of large, well-equipped central houses. Small local packing stations have completely disappeared. Much research is undertaken both by the State and by private associations. Care is taken that any results obtained receive very wide publicity among growers.

* Since October 1939 the title and Monthly Agricultural Bulletin has supplanted that previously used, viz. *Agricultural Supplement to the Palestine Gazette*.

629. PASCUAL, A. 634.3
Citrus growing in Algeria.

Int. Rev. Agric. (Mon. Bull. agric. Sci. Pract.), 1940, 31 : 41T-7T.

A short article on the citrus industry of Algeria. The types of orange grown may be divided into early, midseason and late, typified by the Navels, Maltese and Jaffas respectively. The usual stock is sour orange, though rough lemon is also used. Yields are hampered by the native habit of close planting. Farmyard manure is given at 5 years old and in the intervening year a complete chemical fertilizer in which potash plays an increasing part as the tree ages. The total annual amount of irrigation water per hectare per season required for a grove in full bearing is 4,500-5,500 cubic metres.

630. TISSOT, P. 634.3 : 31
 Production et commerce des agrumes dans le monde. (**World production and commerce in citrus.**)
Rev. Bot. appl., 1939, 19 : 765-84.

A brief account of the situation in regard to citrus production and trade throughout the world. Each country is dealt with separately.

631. CALIDIORE, E. 634.31
 Il gruppo delle arance sanguinelle. (**The group of blood oranges known as sanguinelle.**)
Ortofrutticoltura ital., 1938, 7 : 121-2, 201-4, 222-6, 1939, 8 : 6-9, 30-4.

The author gives a detailed account of the morphological characters of the chief varieties of the two chief strains of the sanguinello blood orange, namely, Sanguinello commune and S. moscato. The demand for these almost seedless varieties both in Italy and abroad has steadily increased. Not only are they popular on the markets of Germany, Switzerland, Holland and the Scandinavian countries, but they have excellent storage and transport capacity and are easily grown. For a detailed account of their properties and requirements the reader need go no further.

632. MENDEL, K. 634.3-1.541.11
Seedling size as a criterion for selection of sweet lime stocks.
Hadar, 1940, 13 : 44-8, 81-4, bibl. 18.

Three groups of one-year-old sweet lime (*Citrus aurantifolia*) stocks arranged according to size were, after elimination of variants, recorded over a period of 8 years. The intensity of growth of the thin stocks was much superior to that of other thicker groups and in 3½ years after planting differences between the groups ceased to be significant. There were no significant differences in yield of the scions grafted on these stocks. It is concluded that in selecting sweet lime stocks the elimination of morphologically deviating types is all that matters. These amount to about 2%.

633. RYNDIN, N. V. 634.3
Tasting citrus fruits in Russia. [Russian.]
Soviet Subtropics, 1940, No. 2 (66), pp. 28-32.

Fruits tasted by an experts' committee in Georgia, U.S.S.R., included 17 orange, 11 mandarin, 5 grapefruit and 8 lemon varieties partly native and partly introduced to Russia. The fruit of the different varieties was picked at several places in 1938. The results are tabulated. The system of fixed marks is so simple that the data can be read from the tables.

634. FEDIN, A. KH. 634.334 : 581.192 : 581.144.4
Daily sugar fluctuations in lemon leaves. [Russian.]
Soviet Subtropics, 1940, No. 2 (66), pp. 43-4.

Biochemical composition of leaves produced by lemon trees during one growth season at Batum varied and remained so throughout the year. Leaves older than 1 year contained more starch.

The older the leaves, the higher was their starch content. During the day carbohydrates increased in young but not in the old leaves. The accumulation of carbohydrates by plants was negatively affected by excessive soil humidity for prolonged periods (25 days).

635. TADEOSYAN, P. YA. 634.322-1.84

The effect of nitrogenous manuring on mandarin yields. [Russian.]

Soviet Subtropics, 1940, No. 3 (67), pp. 31-2.

In 1937 manurial trials with 7-year-old mandarins were started at a State farm in Ajaria. Experimental red soil contained some 5% humus, 0.220 to 0.234% total nitrogen and 0.216 to 0.270% phosphorus. The pH was from 4.3 to 4.9. All trees were given N, P, and K. Some experimental trees were given one N dressing in spring together with P and K, others were given normal or increased amounts of N in several dressings. It is concluded that N is best applied in several doses and thus given leads to higher yields and better shoot growth. A significant further increase in yield can be produced by increasing the total amount of N given.

636. PARKER, E. R., CHAPMAN, H. D., AND SOUTHWICK, R. W. 634.334-2.19 : 546.711

Manganese deficiency for citrus in California.

Science, 1940, 91 : 169-70, bibl. 5.

The authors cite an instance of poor colour and mottling in leaves of a lemon tree in the Santa Clara River Valley in Southern California being cured by spraying with concentrated MnSO_4 . The immediate result was severe injury and repression of new growth but 2 years later the treated limb produced perfectly normal new growth. No improvement was noticed elsewhere in the tree. Although liberal applications of MnSO_4 were made at the same time to the soil round other affected trees, no improvement was noted. Further, in July, 1939, analysis of leaves of lemon trees in the same area suffering from premature decline indicated a low manganese content. Treatment of several trees by injection with C.P. $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$ solutions and crystals (3-8 g. per 3 inch limb) as well as by spraying with 1.25-1.5% solutions of this material, resulted in greening of leaves within 15 days. The sprays caused slight burning of tender leaves. Subsequently several hundred trees were similarly treated with the same effect. These results indicate a manganese deficiency for citrus in the area.

637. URUSHADZE, D. K. 634.3-1.874

Green crops for citrus groves on the Beria state farm. [Russian.]

Soviet Subtropics, 1940, No. 3 (67), pp. 39-40.

Of a large number of varieties of leguminous plants belonging to 7 species that were studied at the Beria State farm only lupins can be recommended as a green crop for citrus groves in the Zachorokh area. Blue narrow-leaf lupins, which under experimental conditions were most productive, are not recommended for interplanting on account of their great susceptibility to fungal diseases. Yellow and Japanese lupins grown among lemons on slopes and hills should be sown early in order to avoid their destruction during the operations in the groves, when the lemon trees are covered for the winter.

638. MGALOBlishvili, S. V. 632.111 : 634.3

Heaters for the citrus groves. [Russian.]

Soviet Subtropics, 1939, No. 12 (64), pp. 24-6.

Good results are claimed for a new orchard heater used in the citrus groves in Soviet subtropics in winter 1937-8, where in several instances temperatures had fallen to nearly -10°C . The heater itself is not described nor is there any reference to the kind of fuel used, but its performance was considerably better than that of comparable American heaters.

639. KATAR'YAN, T. G. 634.334-2.111
After-effect of winter covers on the physiological condition of lemon tree.
 [Russian.]
Soviet Subtropics, 1940, No. 1 (65), pp. 34-8.

In 1936 the physiological after-effect of different types of individual covers for lemon trees was studied at the Sukhum Botanical Garden. The results may be summed up as follows:—All types of cover studied were found to affect the physiological processes in plants, not only during the winter period, when the plants are covered, but also for a considerable period afterwards. The plants only resumed their normal physiological functions in June or July. Maize straw mulch type of cover upset the normal conditions most severely, causing the loss of all foliage during the winter. Celluloid films (particularly two layer films) caused an early vigorous growth, thus bringing about early exhaustion of the plants. As a result plants thus covered were unable to resume their normal physiological activities until mid-July. Three-layer and one-layer cheesecloth covers and bamboo covers showed little difference regarding the physiological condition of the overwintering lemon trees. However, three-layer cheesecloth proved to be the best cover during the winter. Under such covers lemon trees retained young leaves and flowers, and bore fruits despite a temperature of -4.0°C . Controls during the same winter lost, not only their fruits and flowers, but also a large portion of their leaves. The efficacy of cheesecloth covers is explained by provision of light and moisture conditions which make the plants more hardy. Such covers have also the advantage of maintaining the warm temperature radiated from below.

640. MEZZETTI, A. 632.314 : 634.334
 Ricerche sull' eziologia della piticchia batterica dei frutti di limone. (Study
 of the organisms causing black pit of lemons.)
Boll. Staz. Pat. veg. Roma, 1939, 19 : 189-221, 251-92, bibl. 75.

In this well-illustrated and copiously documented article the author reviews the literature on the subject of black pit of lemons. He notes the many names given to the causal organism and discusses Italian work on the diseases caused by *Bacterium syringae* (V.H.) E.F.S. and closely related bacteria. Black pit has been studied in nature and on fruits artificially inoculated. Shoots of both lilac and pear have been inoculated with the causal organism and have produced symptoms analogous to those observed by other authorities, which indicates that it may also act on its host by means of a poisonous substance. Of sixteen specimens examined of different origin, eight were assigned to *B. syringae* by phytopathological examination. Certain unsolved problems with regard to *B. syringae* and closely related species are discussed and various theories are propounded.

641. STAHEL, G. 634.3-2.4
***Corticium areolatum*, the cause of the areolate leaf spot of citrus.**
Phytopathology, 1940, 30 : 119-30, bibl. 3.

A full account of the incidence of areolate leaf spot of citrus in Surinam. Sour orange stocks suffer most severely. Grapefruit, pomelo, mandarin and King are susceptible. The common orange is fairly resistant except under heavy shade. The author has never seen it on lemon, lime, succade or kumquat. The most economic control in sour orange nurseries lies in the collection and burning of all spotted leaves. Bordeaux spraying for scab, *Elsinoë Fawcetti*, controls leaf spot also. During a long continuous rainy season grapefruit leaves suffer badly from it. A thorough spraying of the soil at the start of the rainy season may hinder infection. If the new leaves are, nevertheless, heavily spotted, they should be sprayed, especially on the under side on dry days.

642. FAWCETT, H. S., AND KLOTZ, L. J. 634.3-2.8
Infectious variegation of citrus.
Phytopathology, 1939, 29 : 911-2, bibl. 4.

A note on the possibility of transmission of infectious chlorosis of citrus by budding.

643. NAUDE, C. P. 634.31-2.48

Removal of sooty blotch from oranges.

Bull. Dep. Agric. S. Afr. 212 (*Chemistry Series* 159), 1940, pp. 13.

A cheap bleaching solution of sodium bicarbonate-chloride of lime was as effective in bleaching the sooty blotch affected oranges as the eusol and eusol-soda ash mixtures. Further experimental work, particularly with reference to the most suitable formula for the sodium bicarbonate-chloride of lime bath for South African pack house conditions are being carried on at Capetown and the publication of the results is promised in due course.

644. WAGER, V. A. 634.31-2.45

***Alternaria Citri* and the November-drop problem of Washington Navel Oranges in the Kat River Valley.**

Sci. Bull. Dep. Agric. S. Afr. 193, 1939, being *Plant Industry Series* 46, pp. 18, bibl. 3.

Experiments conducted in Cape Province for three years led to the conclusion that the so-called November drop of young Navel fruits is not brought about by *Alternaria Citri* or any other fungus but can be correlated with weather conditions. A drop invariably follows 3 to 8 days after harsh conditions, which comprise hot, dry winds, with a temperature over 80° F. and a relative humidity of less than 15%. Possible means of reducing the drop are discussed. They include the provision of adequate soil moisture and the growth of a herbaceous crop to ensure atmospheric moisture between the trees during the critical period. A plant that suggests itself is Hubam clover. Planted in May or June it will be some 7 feet high by November and, granted good conditions, 9 feet by early January, when it can be turned in.

645. SHIFF, M. 664.85.31 : 634.31-1.5

The influence of orchard conditions on the incidence of wastage in Palestinian oranges.

Reprinted from *Hadar*, 1939, 12 : 233-6.

The series of experiments reported here was carried out by the author over a period of 4 years as horticultural station superintendent at Jaffa. So far as possible uniform treatment and conditions were observed throughout. The effect of 4 factors, stock, soil, cultivation, and prestorage treatment, was observed. *Stock.* It was found that trees on sour orange were less liable to waste than those on sweet lime. Fruit from trees on the latter should be picked earlier than those on the former. *Soil.* Fruit grown on "Kurkar" soil is more liable to waste than that on light or heavy soils and should accordingly be picked earlier. *Cultivation.* There are indications that fruit from medium irrigation trees showed least waste. Fruit from plots to which a fairly heavy organic dressing and complete fertilizers, including lime, were given showed least waste. *Prestorage treatment.* No conclusions could be reached as to the best time of day to pick or the efficacy of wilting.

646. THOMPSON, W. L. 634.3-2.752

Cultural practices and their influence upon citrus pests.

J. econ. Ent., 1939, 32 : 782-9, bibl. 10.

An account of observations made on the effect of various spray practices on the incidence of scales in citrus orchards. The following conclusions were reached:—Heavy inert residue sprays of copper and zinc compounds not only inhibit the growth of entomogenous fungi which attack scales, but also create a condition favourable for purple and Florida red scale development. Purple scales were more abundant on trees with a high percentage of green leaves, where a magnesium deficiency had been corrected, than on trees with a high percentage of bronzed leaves, where the magnesium deficiency still existed.

647. WASSER, R. E. 634.3-2.752-2.96
On the biological control of *Pulvinaria aurantii* Ckll. in Abkhazia.
[Russian.]

Plant Prot. Leningr., 1939, No. 1 (20), pp. 55-7.

Under the humid climatic conditions in Abkhazia a white pathogenic fungus of *Cephalosporium* sp. was found to attack and to destroy a large percentage of *Pulvinaria aurantii*. The activity of the fungus was particularly marked in mid-summer and autumn. It may be noted that in Abkhazia *Pulvinaria aurantii* not only occurs on citrus fruits but also on other fruit trees such as Japanese persimmon (*Diospyros Kaki*), loquats (*Eriobotria japonica*), etc.

648. OSBURN, M. R. 632.752 : 634.3
Control of the purple scale (*Lepidosaphes beckii* Newm.) and the Florida red scale (*Chrysomphalus aonidum* L.).

J. econ. Ent., 1939, 32 : 688-90, bibl. 3.

SPENCER, H. 632.752 : 634.3
Increases in citrus scale insect infestations from heavy residue and from copper spray mixtures.

J. econ. Ent., 1939, 32 : 686-8, bibl. 6.

NEWELL, W., AND BROWN, A. C. 634.3-2.752
Eradication of the citrus blackfly (*Aleurocanthus woglumi*, Ashby.) in Key West, Florida.

J. econ. Ent., 1939, 32 : 680-2.

649. SVESHNIKOVA, N. M. 634.3-2.651.3
Citrus nematode in Soviet Subtropics. [Russian.]

Soviet Subtropics, 1940, No. 1 (65), pp. 40-3.

Illustrated descriptions are given of the adult male and female citrus nematode (*Tylenchulus semipenetrans* Cobb.). Hot water treatment and biological control are briefly discussed.

650. NOBLE, N. S. 632.96 : 632.79 : 634.3

Epimegastigmus (*Megastigmus*) *brevivalvus* Girault : a parasite of the citrus gall wasp (*Eurytoma fellis* Girault) ; with notes on several other species of hymenopterous gall inhabitants.

Sci. Bull. Dep. Agric. N.S.W. 65, 1938, pp. 46, bibl. 27.

The most important parasite of the citrus gall wasp in New South Wales is the torymid wasp, *Epimegastigmus brevivalvus* Gir.

651. HOPKINS, J. C. F. 632.3 + 632.4 + 632.8
A descriptive list of plant diseases in Southern Rhodesia (and their control).

Mem. Dep. Agric. S. Rhodesia, 2, 1939, pp. 51.

This is an alphabetically arranged list of plants with their respective diseases and notes on the control thereof in Southern Rhodesia. The publication is designed to aid farmers, gardeners and plant pathologists. For fuller details of control measures the reader is referred to the Plant Pathology branch of the Department of Agriculture, Salisbury.

652. NATIVIDADE, J. V. 634.63-1.541.11

Sobre a existência de raízes aéreas latentes na oliveira (*Olea europaea* L.) e os novos aspectos do problema da propagação vegetativa. (The existence of aerial roots in the olive and its meaning to the propagator.) [French and English summaries 2 pp. each.]

Reprinted from *Agronomia lusitana*, 1940, 2 : 25-73, bibl. 48.

The author makes a considerable contribution to our knowledge of olive anatomy and of the best methods of propagation. The swellings on the trunk of olives known as ovuli and used

since remote times for propagation have been found by him to contain not only dormant buds but also a number of root initials. He considers that the ovuli should, therefore, be regarded as root-bearing mamillae. He describes them in detail. They arise in the immediate neighbourhood of the vascular cambium, while the buds originate in the secondary cortex close to the phloem. The roots are more frequently found at the lower end of the ovuli pointing to the ground, while the dormant buds are more frequent at the top end. The ovuli are, then, neither pathological nor at all similar to the burr-knots of fruit trees. Contrary to current opinion they show a marked geotropism. At whatever level of the trunk they are formed they grow towards the ground with a cord-like growth which buries itself in the ground and forms roots. These roots soon compete with the ordinary roots of seedlings or those formed by cuttings and eventually the latter die and rot leaving a root system in adult trees made up entirely of roots arising from the ovuli cords, and overgrowths at the base of the tree. This presence of latent root initials in the old wood explains the success which is reported from the planting of old stems and also accounts for the preference shown by growers for large cuttings of ovuli as a means of propagation. It is suggested that the earliest age at which the stem in each olive variety produces these roots and any factors which may hasten the process should be determined by examination. The present study shows that the arguments in favour of seedling rootstocks are not well founded. It has been proved, with grafting as usually practised, that the appearance of root-bearing swellings inevitably causes the scion to root and that only this shallow root system ensures the nutrition and fixation in the ground of trees of fruit bearing age. Meantime the rootstocks act merely as a nurse until the scion has rooted. The normal habit of using unstandardized and variable rootstocks of slower growth than that of the scion stresses the need for further investigations on stock influence during this period of interdependence. It seems desirable that the growth of the tree in its early years should be hastened by the use of vigorous types of rootstock raised vegetatively. The Pomology Department of the Estação Agronomica Nacional of Portugal is continuing its studies on the subject.

653. BARNES, H., AND WILLS, J. M. 588.427
Passion fruit growing in Queensland.
Qd agric. J., 1940, **53** : 55-85.

A comprehensive account of the cultivation of the purple passion fruit (*Passiflora edulis*) in Queensland for market. Much useful information as to the methods of getting the best out of the plantation is given. There are many helpful illustrations.

654. EASTWOOD, H. W. 588.427 : 631.542
Pruning passion fruit vines.
Agric. Gaz. N.S.W., 1940, **51** : 31-2.

The pruning discussed here is heavy pruning occasionally necessary on account of disease, neglect or overcrowding. The time to do this is in full summer (on the N.W. coast of N.S.W.) when the first crop has been gathered and the wet season has set in. To prune during the dry season often gives a severe check. All growth should be cut back to the main branches leaving only sturdy laterals, some of which should be shortened back to 4 inches and others left up to 2 feet. The main branches can, if necessary, be replaced by vigorous yearling wood which will soon produce strong lateral growths. Any thin willowy wood should be cut off.

655. SMITH, W. P. C. 588.427 : 632.48
Brown spot, a serious disease of the passion vine.
J. Dep. Agric. W. Aust., 1939, **16** : 445-50, bibl. 3.

Brown spot (*Alternaria Passiflorae*) of passion vine (*Passiflora edulis*) is described from Western Australia for the first time. The symptoms are the appearance of brown spots on the leaves, which last become paler and fall very rapidly, while on the branches dark brown lesions develop which elongate often to several inches and finally encircle the branch, whereupon sap flow is checked and the fruit above and distal parts of the branch wilt. This wilting enables the disease to be detected on vines which otherwise appear quite healthy. The fruit itself may also become

badly marked. The spread of the fungus is favoured by lack of pruning and climatically by warm moist weather. Control consists in keeping the vines systematically trained rather than allowing them to form a tangled mass, by spraying after pruning and at monthly intervals in spring and summer with bordeaux mixture 4 : 4 : 40 + a spreader, by periodical examination of vines and removal of diseased portions, and by reduction to a minimum of artificial watering.

656. HANNA, A. D. 634.64-2.78
The pomegranate fruit butterfly *Virachola livia* Klug. Morphology, life history and control.

Bull. Minist. agric. Egypt, 186, 1939, pp. 54, bibl. 38 + coloured plts. and figs.

A very useful contribution to the study of this pest which has proved ruinous to the pomegranate in Egypt.

657. ANON. 634.651

The papaya or papaw (*Carica Papaya*).

Agric. Suppl. Palestine Gaz. 39, 1939, pp. 77-80.

HOFMEYR, J. D. J.

634.651

Genetical studies of *Carica Papaya* L. I. The inheritance and relation of sex and certain plant characteristics. II. Sex reversal and sex forms.

Sci. Bull. Dep. Agric. S. Afr., 187, 1938, pp. 64, bibl. 78.

658. ASHBY, M. 633.85

The tung oil industry of the United States.

Bull. imp. Inst., 1940, 38 : 5-32, bibl. 11.

This paper reviews the position of the tung oil industry in the United States as seen by the author during an officially sponsored tour of the tung growing regions of the Gulf States. The species commonly grown, *Aleurites Fordii*, requires a well-marked winter season to ensure proper dormancy without which its rhythm becomes unbalanced and it fails to bear ; on the other hand it is extremely susceptible to frost damage or to prolonged periods of drought. Suitable climatic conditions are restricted to a narrow belt less than 100 miles wide running round the Gulf of Mexico. The article describes the methods of clearing the ground which is usually covered by *Pinus palustris*, the turpentine pine. The plantation is grown from seed sown either in nurseries or in permanent positions. Most of the spacing is too close ; 25 ft. x 30 ft. is suggested by the Department of Agriculture as being suitable. Close planting with the idea of subsequent cutting out has proved uneconomic. Manures are usually applied from time to time. Experimental manuring on a grove which had previously received none resulted in a high response and the same striking recoveries are to be seen when cover crops are introduced on semi-neglected plantations. The individual tree yield is extremely variable largely on account of frequent frost injury, and figures for the purposes of generalization are valueless ; possibly an average yield per tree in the field could be put at 10 lb. Only about 38% of the oil is recoverable at present. The yield of oil per acre from a good crop from mature trees would be about 190 lb. As regards improvement of the crop it seems that selection and breeding present the best opportunities for advance. Vegetative propagation by budding presents no great difficulty, though great individual differences in response have been found. A description is given of the oil extraction machinery. Although much of the information is available in the literature on tung oil the article contains accounts of estate practices which hitherto do not seem to have been published.

659. WEBSTER, C. C. 633.85
Recent progress in the cultivation of tung oil trees (*Aleurites Fordii* and *A. montana*).

Trop. Agriculture, Trin., 1939, 16 : 267-71, bibl. 13.

The condition of the tung growing industry in various countries is examined and shows that nowhere has tung become established as a successful plantation crop. In all tropical countries

Aleurites montana has proved more successful than *A. Fordii* in that it grows very much bigger, starts to yield earlier and, owing to the fact that it bears its fruit in clusters, has a greater bearing surface than *A. Fordii* trees of equal size. The higher proportion of male trees amongst *A. montana* is offset by its greater yield. Present plantations consist almost entirely of *A. Fordii*. A few points in connection with cultivation are discussed.

660. ANON. 633.85

Report on an experimental plantation of tung oil trees (in Cyprus).

Cyprus agric. J., 1940, 35 : 15-6.

An experimental plantation of *Aleurites Fordii* trees at Polis in Cyprus in 1930 on a medium loam, pH 6.8, shows that the yield in Cyprus compares favourably with that in Nyasaland and elsewhere, but that unless prices go up considerably tung trees will not yield such a good return as almonds. Trials are now being carried out on poorer soil.

661. GUTIEV, G. T. 633.85

Ecologico-geographical trials with tung trees in Abkhazia. [Russian.]

Soviet Subtropics, 1939, No. 12 (64), pp. 15-20.

The cultivation of tung trees under different climatic and soil conditions in Abkhazia was studied for several years. It involved observations on a large number of small plots throughout Abkhazia, each plot comprising some 25 one-year-old trees, spaced at 4×7 m. and grown in the usual manner. The following conclusions were reached :—The cultivation of *A. Fordii* was found to be economically possible on a wide area in the valleys of the Sukhum, Ochenchir and Galsky Districts, provided the beds were raised, soils adequately drained, and vigorous cover crops sown in August. The hilly areas of the Sukhum, Gudaut, Ochenchir and Galsky Districts promise still greater scope for its cultivation. In these areas the development and hardiness of the trees was very satisfactory, and the yields produced by 4-year-old trees were higher than those of tung trees grown in U.S.A. *A. cordata* trees were less vigorous, less hardy and less productive than *A. Fordii*. On non-alkaline humus carbonate soils at 400 m. above sea level both kinds grew extremely well, were vigorous and produced high yields. *A. Fordii* grew satisfactorily and produced fair yields on marl and chalk soils, but showed leaf chlorosis. *A. cordata* would not grow on lime.

662. HOH, H. C. 633.85

Genus *Aleurites* in Kwangtung and Kwangsi. [Chinese summary.]

Lingnan Sci. J., 1939, 18 : 303-27, 513-21, bibl. 84.

The species dealt with in this study of *Aleurites* in China are *A. Fordii*, *A. montana* and *A. moluccana*. In each case a botanical description is given accompanied by a history of the species as regards China, the distribution of each sort in the two provinces being shown by means of tables and maps. The cultural and environmental requirements of the trees are discussed and suggestions are made as to how the somewhat haphazard methods employed by the Chinese could be modified in the light of Western experience.

663. GEORGI, C. D. V., AND ASHBY, H. K. 633.85

Tung oil on Cameron Highlands.

Malay. agric. J., 1940, 23 : 21-5.

An experimental plantation of *Aleurites montana* on the Cameron Highlands, Malaya, is proving more successful than a similar trial with *A. Fordii*, which failed completely. Even so neither of them is suited to the Malayan climate. Although the *A. montana* trees are nearly 7 years old no substantial crop has been yet harvested. Such nuts as have been analysed have a higher percentage of kernel and a higher oil content than Ceylon nuts but produce a generally lower grade of oil than *A. Fordii* oil or than Chinese wood oil.

664. BOGDANOV, N. 633.85
Growing the tung tree in Georgia. [Russian.]
Soviet Subtropics, 1940, No. 2 (66), pp. 14-9.

665. TIMSON, S. D. 631.875
Compost.
Rhod. agric. J., 1939, 36 : 740-52, 791-813, 860-83.

A reprinted and revised edition of an article on composting originally published *ibidem* November 1937 and twice reprinted as Departmental Bulletins Nos. 1048 and 1104. Explanations of the biological processes involved are given in addition to technical instructions for making the compost heaps. The methods most suitable for Rhodesian conditions are discussed.

666. TARANETS, M. P. 631.874 : 581.144.2
The root system of green manure crops in the humid subtropics of U.S.S.R. [Russian.]
Soviet Subtropics, 1940, No. 3 (67), pp. 33-6.

A study was made of root systems and green matter yields of various green crops on heavy alluvial soil in Sukhum. Results are tabulated. Soybeans, cowpeas, *Phaseolus calcaratus* and *P. angularis* (?) produced among the bush forms the largest quantities of green matter and had the greater number of roots. Of the climbers, varicoloured bean, velvet bean and Dolichos bean had the best developed root systems. The roots of *P. calcaratus*, American beans, Lima beans and velvet beans penetrated most deeply into the soil, while *P. angularis*, soybean and *Lespedeza* produced the largest quantity of fine feeding roots.

667. NEDOLYA, I. K. 633.525.1 : 581.144.2
The root system of ramie. [Russian.]
Soviet Subtropics, 1940, No. 3 (67), pp. 37-9.

Experiments with ramie at the Colchis ramie research station, U.S.S.R., indicate that root systems change with varying elevation and width of beds, the effect of the latter being more strongly marked. Root systems of ramie plants from beds 90-180 cm., 180-270 cm., and 360-450 cm. wide are shown.

668. PEREVERZEV, G. A. 633.523
Jute cultivation in U.S.S.R. [Russian.]
Soviet Subtropics, 1940, No. 1 (65), pp. 50-5.

Between 1934 and 1938 many seed samples of jute were tested under humid and dry subtropic conditions. They included 20 samples of *Corchorus capsularis* L. and 121 *C. olitorius* L. The cultivation of jute for fibre was possible in Uzbekistan, Tajikistan, Georgia and Azerbaijan. *C. capsularis* gave 16.3 to 24.9% good quality fibre and *C. olitorius* 15.3 to 22.5%. Among both these species were early, medium and late ripening forms. Flowering occurred 50 to 115 days after shoot germination. The individual plants flowered approximately for one and a half months. In Uzbekistan *C. capsularis* was mainly self-pollinating, but apomictic development of fruits was also recorded. *C. olitorius* plants were capable of self-pollination. Seed samples from India and Japan gave plants with the desired characters, e.g. long stalks (2.3 m.), uniform height and lack of branches. Both species could be hastened in development by reducing the normal day of 16-17 hours to one of 10-12 hours. Simultaneously the habit of the plants changed. Under Uzbekistan conditions the effect of light on seed production and growth check was particularly marked in medium and late ripening forms. Late-sown seed was found to give taller plants [more fibre—ED.] and early-sown seed short plants. On the other hand, seed production was higher from earlier-sown plants. Jute greatly benefited from nitrogenous manuring.

669. KLYUSHKIN, P. A. 633.88.32.491

Growing *Ricinus communis* L. as a perennial in Russia. [Russian.]

Proc. Lenin Acad. agric. Sci., Moscow, 1939, No. 21-22, pp. 21-3.

In U.S.S.R. the castor oil plant has hitherto been grown only as an annual. Early in 1937 several plants were noted at Geokchai (Azerbaijan) which had survived from 1936. The seed collected from these plants, which had the characters of an early ripening Chinese subspecies, was sown in spring 1937. The plants obtained from the seed showed vigorous growth during the 1937 season, produced large amounts of seed, withstood the winter and continued to grow in 1938.

670. MILLER, J. C. 633.492-1.523

Further studies and technic used in sweet potato breeding in Louisiana.

J. Hered., 1939, 30 : 485-92, bibl. 18.

671. NIKITA STATE BOTANICAL GARDENS, YALTA. 635.952.2 : 581.1

Biochemistry and physiology of some tropical and subtropical plants. [Russian.]

Publ. (Nikita) Lenin Acad. agric. Sci. Moscow, 1939, Vol. 21, No. 2, pp. 176, bibls. for each section, 6.00 roubles.

This is a symposium of six papers by several authors. The first two deal with the chemical composition of *Ocimum canum* Sims, *Ocimum pilosum* Willd. and hybrids thereof. In the third paper results are reported of biochemical analyses of the leaves of several varieties of peaches, plums and apricots and of the leaves of *Ailanthus glandulosa* and *Pentstemon*. Next follows a drought resistance study of almonds, peaches, olives, pears and apples, a paper on hardness of almonds and peaches, and lastly a paper dealing with the hydrocyanic acid content of almonds.

TROPICAL CROPS.

672. MCCALLAN, E. A.* 63

Report on the development of agriculture in the Bahamas.

Nassau, N. P., Bahamas, 1939, pp. 107, bibl. 69.

Among many improvements suggested, including the creation of an agricultural department and introduction of agricultural education in the Bahamas, those concerning horticulture and plantation crops may be summarized as follows:—The present-day practices should be replaced by practices involving conservation of soil moisture by the liberal use of farmyard manure, seaweed and leguminous green manure, mulching, rotation of crops, use of better tools, terracing and planting windbreaks. Too great dependence on artificial fertilizers and the limitations of soil analyses are commented on. Control of pests and plant diseases can be greatly improved. Superior types of subsistence, local market and export crops should be introduced. Recommendations are made regarding many different crops in each group, and sources from which superior types may be obtained are noted. Among the export crops tomatoes and Bermuda onions are particularly promising. Markets should be improved by restriction of imports of certain vegetables and fruits, and by organizing exports. Central packing of export produce and mechanical sizing of tomatoes, onions, citrus and other produce under one Colonial brand and erection at the dock of a pre-cooling plant are suggested.

673. HUTCHINSON, J. 575.3

The flora of Madagascar.

Nature, 1940, 145 : 448-51, bibl. 2.

A very brief survey noting the floral connexions with other parts of the world. The flora of Madagascar is only in part related to that of tropical Africa. Two maps show the range of the nepenthe or pitcher plants and of the genus *Vellozia*. The latter runs from the West of South

* Late Director of Agriculture, Bermuda.

America to Madagascar, while the former includes Madagascar but no part of the African mainland and then right on via Ceylon and Malaya and to New Caledonia.

674. ROBYNS, W., AND LAMB, S. H. 575.3
Preliminary ecological survey of the island of Hawaii.
Bull. Jard. bot. Brux., 1939, 15 : 241-93, bibl. 21.

675. CHOPRA, R. N., AND BADHWAR, R. L. 615.7
Poisonous plants of India.
Indian J. agric. Sci., 1940, 10 : 1-44.

A preliminary review of the poisonous plants of India, either wild or in cultivation. A monograph on the subject has been in preparation for some years and is shortly to be issued. The authors express their gratitude to the Imperial Council of Agricultural Research for their practical assistance in enabling the work to be carried out.

676. GEORGI, C. D. V., AND TEIK, G. L. 632.951
Further experiments with selected plants of *Derris elliptica* Changi No. 3.
Malay. agric. J., 1940, 28 : 44-68, bibl. 4.

The experiments resulting in the selection of certain *Derris elliptica* plants of the variety known as Changi No. 3 were described by the same writers, *Ibidem* 1937, 25 : 187-200 ; *H.A.* 7 : 737. Some of the chief results are as follows :—In both localities (Serdang and Kuala Lumpur) wide variations were found in weight of roots at all ages from individual plants of the same vegetative progeny. Differences in spacing 6 ft. × 6 ft. and 3 ft. × 3 ft. had no effect on root weight *with this variety*. Development of ether extract takes place at a much earlier age than anticipated ; thus, the proportion of ether extract for the parent plant at 23-24 months may be less than that of one member of its vegetative progeny at 12 months. Up to 14% variation at both planting distances in ether extract might be found between a parent plant and any member of its vegetative progeny or between any two members of the progeny selected at random. Low ether extract for one member of a clone is not necessarily perpetuated in its progeny provided the original strain is characterized by high ether extract. There appears to be a significant decrease in ether extract after the age of 21 months. It was possible to select parents whose progeny was consistently superior in respect of ether extract. The findings for rotenone content run parallel with those for ether extract but comparative figures for rotenone for parent plant and vegetative progeny are not available. The average figure of the proportion of rotenone to ether extract for this race is about 45% and is independent of age or spacing.

677. RUBBER RESEARCH INSTITUTE OF MALAYA. 632.64
Meta-poisoning : a warning.
R.R.I. Planters' Bull. 9, 1940, p. 10.

Domestic animals may be poisoned by eating the snails, slugs or meta baits contaminated by the caustic fluid exuded in large quantities by the dying snails. The symptoms are those of acute stomach poisoning and lowering of body temperature. Treatment consists of wrapping the animal in a warm blanket and the administration of castor or similar oil with soothing and purgative properties. Mineral emetics and purgatives should not be given. If treated promptly recovery should take place in 24 hours.

678. TEODORO, N. G., AND ABAYA, F. Q. 633.49
Notes on the preliminary cultural trial with Chinese water chestnuts (*Eleocharis tuberosa* Schultes).
Philipp. J. Agric., 1939, 10 : 397-402.

The Chinese water chestnut is a perennial sedge widely cultivated in China. The tubers are dark coloured and small, measuring 2-3 cm. in diameter. These are boiled and eaten as a vegetable. The present report consists of notes of preliminary trials in the Philippines, which are being continued.

679. PACUMBABA, P. O. 633.513-1.541.5
Comparative studies on the planting of budded and seedling kapok.
Philipp. Agric., 1940, 28 : 816-28, bibl. 6.

At the Philippine College of Agriculture budded kapok (*Ceiba pentandra*) was compared with seed-grown plants. Under nursery field conditions shield budding with the wood removed from the back of the shield was very much more successful (94.6% take) than shield budding when the wood was left on the shield or than patch budding. Failure of patch budding is unusual and here may have been due to an inefficient operator. Seedlings in field and nursery germinated in from 5 to 9 days, with better germination in the nursery. Unbudded seedlings were taller and more leafy than budded plants. Transplanting checked growth in seedlings and budded plants.

680. PALO, M. A., AND CALINISAN, M. R. 633.522-2.3
The bacterial wilt of the abacá (Manila hemp) plant in Davao. I. Nature of the disease and pathogenicity tests.
Philipp. J. Agric., 1939, 10 : 373-95, bibl. 6.

This is a very thorough-going description of the manila hemp disease variously known as "abacá wilt", "vascular disease" and "banana-wilt-like disease", its symptoms, and accompanying disorders. The causal bacterium shows colonies similar to those described for *Bacterium Solanacearum*, an organism which causes a wilt of bananas and of solanaceous plants. The appearance of the injured plants and tissues is shown in 15 plates.

681. GEHLSSEN, C. A. 633.526.23
The present state of knowledge of the intrinsic properties of the sisal fibre.
Int. Rev. Agric. (Mon. Bull. agric. Sci. Pract.), 1939, 30 : 424T-31T, bibl. 4.

The material for this article is derived from investigations at Amani and at Lambeg, Northern Ireland. Much of the work of Amani has already been abstracted in *H.A.* from papers published by the investigators. At Lambeg the spinning qualities of sisal fibres are examined. It is pointed out that a softening agent has to be found which can be attached chemically and so retained firmly by the lignin film, giving the fibre a good grip. It is regretted that owing to propaganda for planting agaves producing short soft fibres the uniformity of the sisal product will be lost. Two or more commodities will thus come on the market suited either for rope making or the spinning of fine yarn as the case may be, which will increase the risk attaching to the cultivation of a single type of sisal.

682. BAKTADZE, K. E. 633.72
Tea selection in U.S.S.R. [Russian.]
Soviet Subtropics, 1940, No. 1 (65), pp. 13-21. "

Selection work was started in 1928 and conducted on a very large scale by the Institute for Tea and Subtropics (VNIChSK). Individual selection, hybridization and inbreeding methods were used. The material consisted of China and Indo-China types. Most of the experimental data are tabulated. The principal conclusion is that the best method of tea selection in Soviet Subtropics consists of individual selection and free cross-pollination among the plants selected.

683. DOLGOV, S. 633.72-1.4
A study of failure of tea plantations in Talysh, Azerbaijan. [Russian.]
Soviet Subtropics, 1940, No. 3 (67), pp. 16-20.

The main reason for the death of tea plants on plantations in Talysh must be sought in the climatic and soil conditions. There is a heavy rainfall in September and October (half of the total annual fall) and a drought in summer. Solid clay at a depth of 30-40 cm. makes an even distribution of moisture impossible. Thus the root growth at any greater depth is checked. It is shown that green manuring, deep cultivation, application of organic matter, and drainage may help. To reduce excess of surface water the use of raised wide beds, each containing 5 or 6 rows of plants, is recommended.

684. DE HAAN, I. 633.72 : 581.4
 De anatomische bouw van de theeplant. I. Stengel en blad. (**Anatomy of the tea-plant. I. Stem and leaf.**)
Archief Theecult. Ned.-Ind. 1939, 13 : 318-43, bibl. 12.

This paper is the first of a series which is to describe and discuss the anatomical structure of the tea plant. The parts dealt with here are the green shoots and leaves. Articles on the bark, wood and root will follow.

685. MITROPOLSKAYA, M. V. 633.72-1.874
Peas as a green crop manure for tea. [Russian.]
Soviet Subtropics, 1940, No. 1 (65), pp. 39-40.

In Russian experiments on red soil tea plantation yields could be increased by 25 to 27.4% by using peas as a green crop manure. The beneficial effect of that crop is attributed mainly to the action of the roots, which improve the physical and chemical properties of the soil.

686. GADD, C. H. 633.72-2.8
Disease in non-productive bushes.
Tea Quart., 1939, 12 : 75-86.
 GADD, C. H. 633.72-2.8
A virus disease of tea.
Ibidem, 1939, 12 : 110-30.

A virus disease of tea in Ceylon known as phloem necrosis is discussed. The author regards this disease as one of the most serious affecting tea. The vector has not yet been discovered. A feature of the disease and one that adds to the difficulty of combating it is that early symptoms of attack are not recognizable. The only advice possible at the moment is to remove all infected bushes where the number of bushes is relatively small, or, failing that, at least those bushes which have become non-productive. Photographic illustrations are given of diseased shoots. The papers were read at tea planters' conferences and the ensuing discussions brought out many facts (and theories) of considerable interest.

687. GADD, C. H. 632.651.3 : 633.72
A destructive root disease of tea caused by the nematode *Anguillulina pratensis*.
Tea Quart., 1939, 12 : 131-9, bibl. 15.

The symptoms of attack on tea by the eelworm, *Anguillulina pratensis*, are a deficiency in and somewhat yellowish appearance of the foliage and a general air of unthriftness. Below ground there is a marked absence of feeding roots and the main woody roots die back to some extent. The roots are not distorted or knotted as in cases of attack by the nematode, *Heterodera marioni*. Microscopical examination is necessary to confirm the diagnosis and search for eelworm should be made at the junction of healthy and dead cortical tissue in the main roots. Instructions are given for conducting the examination. The eelworm is spread largely through soil movement, i.e. on the feet of labourers, on tools and by erosion. Treatment of permanent crops so attacked is very difficult. Possibly starvation, which means the eradication of all susceptible plants (weeds) for some years, is the best remedy. Resistant tea plants which could be used for propagation of a resistant stock have not yet been found, though they exist in coffee. The author does not consider that greater attention to cultural methods or a liberal manurial policy likely to be effective.

688. THOMAS, A. S. 635.977.8 : 633.73 + 633.72
Shade trees in Uganda and their relation to the cultivation of coffee and tea.
E. Afr. agric. J., 1940, 5 : 287-93, bibl. 4.

It is shown that in most cases coffee does better under shade and it is, of course, a forest plant in nature. The type of shade preferred is that which is evenly distributed and with branches

high above the tops of the coffee bushes. Shade trees should be grown in succession or in mixture. When these have to be thinned out—for close planting at first is obviously necessary—the trees can be ringed instead of felled; the tree then dies as it stands, disintegrates gradually and no harm is done to the bushes below. The practice also reduces root disease risks, since *Armillaria mellea* will not attack roots deficient in starch. In selecting shade trees many varieties otherwise suitable are put out of competition on account of their strong surface rooting system competing with the coffee roots. *Erythrina abyssinica* is suggested as a likely shade tree since it succeeds in conditions too dry for many other shade trees, is easily established from large woody cuttings and is well adapted to pollarding. A list is given of local trees under which coffee will flourish; these should be retained when land is being cleared for planting. Most useful of all are various *Ficus* especially *F. Thonningii*. They can be grown in the position required from large cuttings and besides supplying shade can provide additional income to the peasant as a source of bark cloth. Of exotic trees *Hevea brasiliensis* is a useful shade for *robusta* coffee in Uganda where its growth is not so vigorous as in a really tropical climate; if the price of rubber rose the tree could be tapped. A number of other non-indigenous trees used for shade in other countries are discussed. Tea requires no shade but needs windbreak protection from drying winds which spoil the flush. *Grevillea robusta* is suggested since it casts little shade.

689. KRUG, C. A., AND MENDES, A. J. T.

633.73

Cytological observations in *Coffea*.

J. Genet., 1940, **39** : 189-203, bibl. 4.

A short description is given of the main morphological characters of 2 interspecific triploid hybrids, *C. arabica* × *C. canephora*. Their growth habit is normal and leaf and flower characters are intermediate in shape and size compared with their parents.

690. FERNIE, L. M.

633.73-1.535

The rooting of softwood cuttings of *Coffea arabica*.

E. Afr. agric. J., 1940, **5** : 323-9.

The method of rooting coffee from softwood cuttings at the Coffee Research Station, Lyamungu, Tanganyika, is described. If it is desired to establish a clonal race, about 20 rooted cuttings of the selected tree are planted out in nursery rows 4-5 feet apart and allowed to grow up on multiple stem. In from 18 months to two years the remaining primary branches are removed and each stem pegged down horizontally. Suckers then grow up vertically from the dormant eyes at the node and can be taken as cuttings. A minimum of 3 new suckers should be left near the base for pegging down for succession. The top of each stem is left to draw the sap the full length of the plant and this can be pegged down as growth proceeds. The cuttings are struck in closed glass frames maintaining a high humidity; the medium is peat moss 2 parts and sand 1 part.*

691. NARASIMHASWAMY, R. L.

633.73 : 638.12

Bee flora of a coffee estate. I.

J. Mysore agric. exp. Union, 1940, **18** : 11-5, bibl. 2.

In a previous article, *Ibidem* 1938, **17** : 65-72, a list of garden plants visited by the Indian honey bee (*Apis indica* Fabr.) was given. The present author has confined his studies to the flora of coffee estates with special reference to the availability of pollen and nectar, time of blooming and time of day in which the bees visit the flowers. He gives here a list of plants, grouped as crop plants (3), shade trees, etc. (15) and weeds (12) which commonly grow in coffee estates in Mysore and are useful to bees. It is hoped to continue the study.

* For a full account of past and present methods used in the vegetative propagation of coffee, see "Vegetative propagation of tropical and subtropical plantation crops". *Technical Communication* 13, Imperial Bureau of Horticulture and Plantation Crops, East Malling, 1940, 3s. 6d.

692. SLADDEN, G. E. 633.73-1.542

La taille du caféier arabica. (**Pruning arabica coffee.**) [Flemish summary.]

Bull. agric. Congo belge, 1939, 30 : 503-35, bibl. 8.

An article on the proper pruning of *arabica* coffee. It is well illustrated with clear diagrams. Several systems are discussed. The multiple stem system is favoured and a method of converting the cylinder-shaped single stemmed tree into a multiple stem is described and illustrated.

693. SHEPHARD, C. Y. 633.74

The cacao industry of Trinidad. The rehabilitation of an old field.

Trop. Agriculture, Trin., 1939, 16 : 247-51.

The study of rehabilitation of old cacao fields has shown that the systematic replacement of low yielding trees by selected supplies will arrest decline in the yields of fields on suitable soil without necessarily any increase in the total expenditure of the estate, merely involving a redistribution of effort. A selected supply on good soil should pay its way in seven years and thereafter yield a profit, provided it receives special attention. Very large increases in yield have been obtained on some soils in response to certain artificial fertilizers, on others the response has been insufficient. It is, however, possible to foretell by competent examination whether the prospects of success justify the effort. There must be wholesale rehabilitation if the cacao industry of Trinidad is to be restored to prosperity, but efforts should be concentrated on suitable sites. Fields which are hopelessly unprofitable should be abandoned and so enable a larger portion of the area maintained to be rehabilitated.

694. SMALL, J. 633.832

The clove, a pocket lens study.

Food, 1940, 9 : 177.

DENSTON, T. C.

Cloves, their structure, qualities, varieties and cultivation.

Ibidem, 1940, 9 : 179-82.

In these two articles we are given an account of the structure of the clove, its uses, types and source. The clove of commerce is produced chiefly in Zanzibar and the neighbouring isle of Pemba, from which two places come over 80% of the world production, other producers being Madagascar, the Dutch East Indies and Penang. The clove as known here is the dried flower bud of *Eugenia aromatica* Baill. Its properties are due entirely to the essential oil present in glands in the sepals, petals, stamens and hypanthium.

695. WIGG, L. G. T. 633.832

The production of field plants of the clove tree.

E. Afr. agric. J., 1940, 5 : 268-78, being reprinted from *Bull. Dep. Agric.*

Zanzibar 1.

The paper describes the nursery methods used in the production of clove plants from selected seed for sale to growers in Zanzibar. The method produces a greatly improved plant in comparison with the self-sown seedlings which are commonly employed. The fruit is collected from under the selected tree at regular intervals, the ground being swept after each collection. The fruits are soaked for 2 or 3 days in water to remove the outer flesh and assist germination. The single seed (rarely two) then disclosed consists of two large green cotyledons and a well-developed radicle. Desirable characters for selection are described, the chief of these being that the cotyledons should be of a fresh olive green colour and not reddish, and the radicle should not be blackened. The weight of good seed is about 400 to the pound. Rigorous selection rejects about 48% and should ensure a germination of about 96% from the remainder. Seed beds are prepared some time in advance and the fine tilth maintained by a thick litter of old leaves. Removable overhead shade is provided 7 feet above the bed. When sowing the litter is raked off and a bed marked with a band drill roller in lines 8 inches apart. Over these lines a batten provided with pegs 4 inches apart is pressed and in the holes so formed the seed is placed radicle downwards, half the seed extruding. The litter is then replaced without further covering with

soil. Seed inserted in other than the correct position produces contorted plants. As the seeds germinate they are freed by the drawing back of the litter, which, however, must remain on the beds. The first pair of leaves should have expanded in a month from sowing. Transplanting to nursery rows is done when the seedlings are 2-3 months old. The ball of earth must be left on the roots but long main roots may be reduced. A month or two before the plants leave the nursery for the field they are again lifted, the ball of soil wrapped in banana leaves (failing a more satisfactory material) and the plants stood under shade close together for mutual support. This results in the production of many turgid white roots. The need for the ball of soil creates a serious problem for the nursery for, as the authors point out, a nursery distributing 40-50,000 plants a year would at the same time distribute about 200 tons of its best soil. Experiments with bare root planting on a field scale have been unsuccessful, though bare root plants pre-treated as above have been established in sterile sand for pot culture experiments without any sign of shock.

696. RICHHARIA, R. H., AND DHODAPKAR, D. R. 633.853.74
Delayed germination in sesame, *Sesamum indicum*.
Indian J. agric. Sci., 1940, 10 : 93-5, bibl. 1.

Variation in period of seed germination of sesame is attributed to anatomical differences from the normal seed. These are explained and illustrated. The seeds showing delayed germination are rough and black with constricted seed coat. Although doubtless useful in the economy of nature they merely cause a loss to the grower.

697. KERBOSCH, M. 633.88.51
Notes on the cultivation of cinchona and the world supply of quinine.
Int. Rev. Agric. (Mon. Bull. agric. Sci. Pract.), 1940, 31 : 14T-24T, bibl. 4.

The author, who was formerly Director of the Government cinchona estate and experiment station in the Dutch East Indies, gives an historical survey of the quinine industry in all countries. It is mostly a tale of failure largely due to over-production sending the price below cost of production. It was not till 1913, when the producers of the Dutch East Indies came to an agreement with the manufacturers of quinine by which the supply and sale was regulated according to world consumption, that profitable production again became possible. The industry in the Netherlands East Indies is sedulously fostered by the Dutch Government and these islands have practically a monopoly. Nevertheless "it is not as a financial speculation but from common humanity" that the Dutch Government is interested and no hindrance to the provision of quinine when required would be countenanced. The fact that consumption of quinine is far below world requirements is not to be attributed to high prices, since lowering the prices has not had the effect of increasing consumption. It is because no country will in present international conditions incur the expense or spare the personnel necessary to build up the organization which would be required for the effective treatment of great malarial districts. Very great quantities of quinine could be produced by the Dutch East Indies at short notice, should schemes for making it available to malarial districts ever materialize.

698. KREIER, G. K. 633.88.51 : 631.544
Cinchona plants under glass. [Russian.]
Soviet Subtropics, 1940, No. 2 (66), pp. 53-4.

Cold frames proved superior to heated glasshouses for raising *Cinchona* plants on a State farm in Georgia (U.S.S.R.).* The advantages are briefly as follows:—Uniform and healthy growth of plants, greater vigour, hardiness, vitality. Lastly cold frames can be used for vegetative propagation by cuttings. The bushes are rooted up and sent to the factory when about 15 months old.

* For a description of the mass vegetative propagation of *Cinchona* on the system being developed by the Russians, see "Vegetative propagation of tropical and subtropical plantation crops". *Technical Communication 13, Imperial Bureau of Horticulture and Plantation Crops, East Malling*, 1940, 3s. 6d.

699. MOMOT, K. G. 633.88.51

Nursery material for *Cinchona* plantings. [Russian.]

Soviet Subtropics, 1940, No. 2 (66), pp. 54-8.

Trials with *Cinchona* plants conducted for three years in humid subtropics of the U.S.S.R. indicated that the best way to obtain nursery material was by using summer cuttings grown on nutrient soils under shaded cold frames. Cuttings are obtained from special seedling-plots, year-old stools and the plants from which cuttings were taken in the preceding year. 1 ha. in the nursery will provide some 2,000,000 cuttings or a sufficient number of standard seedlings to plant up some 20 ha.

700. BANGHAM, W. N., AND D'ANGREMOND, A. 633.912

Tapping results on some new A.V.R.O.S. *Hevea* clones which originated in cross-pollination.

Arch. Rubbercult. Ned.-Ind., 1939, 23 : 191-217, bibl. 4, and in Dutch, pp. 218-31.

A group of 1,805 *Hevea* clones originating in seedlings resulting from artificial pollinations at the Avros research station or in open-pollinated families of seedlings from earlier crosses was studied as regards yield. The value of artificial pollination from selected pollen parents against haphazard pollination (illegitimate) was again demonstrated, but it was surprising to find that two generations of crossing among the most promising mother trees actually resulted in a large population of families giving an average yield equal to or better than that of one of the best yielding clones yet discovered among millions of trees of the natural population on estates. In view of the shortage of hand-pollinated clonal seed, plantations possessing large groups of trees grown from hand-pollinated clonal seed can use the seeds from these trees as a source of clones and can anticipate high average yields, especially if a strict selection is made among them by means of early tapping and only those giving the highest yields utilized as a source of clones. By this method higher yields will be obtained than from the seedling population from which the clones originated.

701. RUBBER RESEARCH INSTITUTE OF MALAYA. 633.912-1.8

Manuring (of rubber).

R.R.I. Planters' Bull. 9, 1940, pp. 1-2.

Striking increases in growth and yield have been obtained by the regular application of a complete manure to rubber trees of the Dunlop Malayan Estates Ltd when they were brought into tapping 10 years ago, being then 7 years old. The increased yield over comparable unmanured trees was 30% or 200 lb. per acre. The question of whether nitrogen alone would produce adequate results is still unsettled and for the moment the inclusion of phosphate and a little potash is recommended by the Rubber Research Institute.

702. RUBBER RESEARCH INSTITUTE OF MALAYA. 633.912-1.811

Manuring programme for replanted and mature rubber trees.

Circ. Rubb. Res. Inst. Malaya 1,* 1940, pp. 3.

These are general directions on the time and frequency of application, amount of fertilizer, fertilizer mixtures for different Malayan soil types under rubber and on the method of application. Certain adjustments and modifications will be necessary according to peculiar local conditions.

703. RUBBER RESEARCH INSTITUTE OF MALAYA. 632.187 : 633.912-1.556.8

Drought and fire damage. Heat- and sun-scorch of the tapping panel and seedlings.

Circ. Rubb. Res. Inst. Malaya, 11, 1940, pp. 2.

Treatments for rubber plants in Malaya affected by heat- and sun-scorch of the tapping panels and seedlings are recommended.

* Revised.

704. MENDIOLA, N. B. 634.39
Introduction of tsampadak and suspected case of natural hybridization in *Artocarpus*.

Philipp. Agric., 1940, **28** : 789-96, bibl. 12.

There appears to be natural hybridization between *Artocarpus integra* (jack fruit) and *A. Champeden* (tsampadak). To this the author attributes the slow spread of the latter in the Philippines in spite of attempts to popularize it. The tsampadak has several advantages over the jack fruit including the absence of latex in the fruit, a resistance to pests, to which its relative is very susceptible, ease of separation of the edible portions and greater sweetness and digestibility.

705. CHEVALIER, A. 634.39
L'arbre à pain et ses congénères. (The bread fruit tree and its relatives.)
Rev. Bot. appl., 1940, **20** : 25-38, bibl. 10.

The history, cultivation and uses of some species of *Artocarpus* are discussed with special attention to *A. communis* the bread fruit of which there are many cultivated varieties, some seedless. The best way of propagating this species is by root cuttings. In spite of its nutritional value the tree is not widespread in certain parts of the tropics, particularly in West Africa, and this should be remedied.

706. MULLER, H. R. A. 634.441-2.4 + 2.19
Overzicht van de belangrijkste mangga-ziekten in Nederlandsch Indië. (The chief mango diseases in the Dutch East Indies.) [English summary
 $\frac{1}{2}$ p.]

Meded. alg. Proefst. Landb. **40**, 1940, pp. 9, bibl. 14.

Gloeosporium Mangiferae is the most important mango disease in the Dutch East Indies and damages seedlings, nursery plants, leaves, twigs, inflorescences and fruits of older trees. Control is achieved by regular spraying with 1.5% bordeaux. Bordeaux is also a remedy for *Rhizoctonia* damping off which attacks the seedlings. Otherwise a preventive treatment of the soil before sowing with ceresan will prevent it. For bark canker caused by *Physalospora* on stems or main branches cutting away the diseased bark and covering the wounds with a mixture of 92% hard paraffin wax and 8% carbolineum plantarium is recommended. This treatment will also do for *Botryodiplodia*.

707. GONZALEZ, L. G., AND SONGMANI, A. 634.433-1.541
A study of some asexual methods of propagation of the star apple, *Chrysophyllum Cainito* Linn.
Philipp. Agric., 1940, **28** : 836-45, bibl. 8.

The literature on the vegetative propagation of the star apple (*Chrysophyllum Cainito*) is scanty. In recent experiments at the Philippine College of Agriculture marcotting, inarching and cleft grafting were fairly successful while shield budding was not. No other methods were tried. *Marcotting*. About 46% success was obtained with branches about 2 cm. in diameter; larger branches were less successful. With branches of over 2 cm. diameter slightly better results were obtained when the covering of the ringed portion was delayed for 10 days. Treatment with proprietary growth substances was ineffective. Rooting took about 3 weeks. *Inarching*. Inarching on one-year-old seedlings was the most consistently successful method (85-100%). The plants could be successfully severed from the parent tree in 20 days, though they were usually left longer. *Cleft grafting*. The highest percentage of living grafts was obtained with medium-aged (hard brown wood) and old branches (hard grey wood). In all cases, including the less successful young wood, defoliation two weeks before insertion increased the percentage of success. Keeping the severed scion in moist sand apparently very significantly increased success in the case of old scion wood and considerably reduced it in the case of medium-aged and young wood.

708. . . . ANON.

634.441

Fruit research in Madras. (Mango.)*Indian Fmg.*, 1940, 1 : 82-3.

A brief note is given of recent work at the fruit research station, Kodur. An attempt has been made to standardize the side grafting of mangoes, a method which is becoming very popular and likely to supersede the cumbersome method of inarching. The problems considered are the size of scion, the influence of season on take of scions, the optimum length of life of the pre-cured scions after separation and the varietal response to this method. In shield and patch budding great varietal differences in take have been observed. Root grafting of mango devised at this station only 2 years ago has produced a take of over 90%. The propagation by grafting or budding of mangoes bearing an off-season crop has been continued in the hope of establishing strains with this proclivity.

709. TURNER, R.

634.58

Some economic aspects of the ground-nut industry of Northern Nigeria.*Emp. J. exp. Agric.*, 1940, 8 : 39-50, bibl. 12.

A review of the ground-nut industry of Nigeria. The peak year for export was reached in 1937 when 325,929 tons to the value of £4,057,893 were exported. The amount of nuts planted annually is variable and is affected by the price of cotton which is an alternative crop, by the fear of locust invasion which causes the farmer to plant more corn to ensure adequate food supply, or by an increase in the price of corn such as may occur for instance when the tin quota is high and increased labour is taken on at the tin mines. The marketing organization is described.

710. BAIN, F. M.

634.61-2.19

Report on the coconut growing areas of Jamaica.*J. agric. Soc. Jamaica*, 1940, 44 : 25-35.

The report is a result of the examination of the coconut growing areas of Jamaica undertaken in consequence of a disease which has caused serious loss at the western end of the island. The disease was diagnosed as bronze leaf wilt, a physiologic ailment brought about by unsuitable soil conditions. Wilt soils are classified as follows :—1. A close textured surface soil overlying a subsoil impervious to water : this results in waterlogging in wet periods and rapid drying of the surface soil during drought. 2 (a) Soil and subsoil are open textured and free draining, thus there is a relatively poor water supply in dry weather. (b) Soil and subsoil are compact and dry out quickly. 3. Friable top soil with an intolerant marl subsoil layer. The roots of the coconut are dependent on an easily available soil moisture with a well-aerated soil as is found in its natural habitat on the sandy soil of coastal lagoons. Speaking generally, to obtain suitable conditions inland, a soil depth that will enable good root penetration to four feet and an average rainfall of 60-70 inches are necessary to ensure a healthy palm, without the need of soil moisture conservation measures. The groups into which the soils fall in the various coconut districts on the island are indicated and the remedial measures most suitable in each case are outlined. In conclusion a brief note is made of other coconut diseases encountered in the survey and control measures are indicated.

711. CHEYNE, O. B. M., AND CHILD, R.

634.61-1.513

A note on the use of dynamite on hard ground between coconut palms.*Trop. Agriculturist*, 1940, 94 : 22-3.

Charges of 1, 1½ and 2 dynamite cartridges exploded between trees in a coconut grove at a depth of 3 inches in a hard soil with outcrops of ferruginous concretions had little effect. At the explosive centre a cavity of 8" radius was blown downwards to a depth of 1 ft., but no effects were noticed at a radius of 2 ft. from the holes. The object aimed at was deep tillage. It is considered that burying husks treated with suitable fertilizers in trenches or pits between the trees on a regular and systematic plan would be more effective and cheaper.

712. SALGADO, M. L. M. 634.61-1.57

The utilisation of husks on coconut estates.

Leaflet. Coconut Res. Scheme, Ceylon 5, 1939, pp. 7.

Burying the husks in trenches is the best method for conserving soil moisture on coconut estates in the North-Western Province. There is no need to add calcium cyanamide or lime to hasten the decay, since the potash in the husks that forms the only manurial constituent of importance exists in soluble form.

713. VENKATARAYAN, S. V. 634.61-2.693.2

A rat trap for coconut plantations.

J. Mysore agric. exp. Union, 1939, 17 : 188-90.

A detailed and illustrated description of a simple trap, the ingredients for which consist of bamboo and coir rope. The rat in order to reach the bait gnaws through the rope, thereby releasing the trap piston. Granted that it will only catch one rat at a time, it has proved very successful.

714. WARDLAW, C. W., BAKER, R. E. D., AND CROWDY, S. H. 664.85 : 632.4

Latent infections in tropical fruits.

Trop. Agriculture, Trin., 1939, 16 : 275-6.

The latent infections, usually from *Colletotrichum gloeosporioides*, in tropical fruit are discussed. Their study presents considerable technical difficulty. The latent infection remains quiescent during the growth of the fruit in a state of arrested development. With the changes of environment brought on by ripening and the resistance formerly offered, the fungal activity is reduced and a renewal of hyphal growth is possible, culminating in the production of typical disease spots or lesions. On fruits suffering from low storage temperature injury or from certain chemical injuries the latent infection is also enabled to make an early appearance. Control measures are difficult, but as regards mango there is an indication that a total of 5 sprays of burgundy mixture at stated intervals will greatly reduce infection.

715. GRAHAM, G. R. 634.771-2.18

Resuscitation of storm damaged banana fields.

J. Jamaica agric. Soc., 1939, 43 : 530-3.

Banana trees which have been blown down or badly battered should be chopped into 18-inch lengths, split into half with the inner surface turned up and this surface chopped in a criss-cross manner. The trunks so treated are used to form a useful mulch and, more important, the treatment prevents the alarming increase in banana borer infestation which usually follows heavy wind damage. The uprooted tree should be dug out and if there is a follower this should be dug out too and replanted. Followers not so treated take longer to fruit and tend to grow out of the ground with lowered resistance to wind. If one of two healthy large trees in a matt is uprooted the butt must be excavated and the hole filled in with soil. If the destruction is such as to leave the ground bare and unshaded, cover crops of leguminous plants should be sown, one suggested being Overlook beans. These beans should be cut down when flowering and left as mulch. The stumps will then shoot again and give a good crop.

716. MAGEE, C. J. P. 634.771-2.8

Pathological changes in the phloem and neighbouring tissues of the banana (*Musa Cavendishii* Lamb.) caused by the bunchy-top virus.

Sci. Bull. Dep. agric. N.S.W. 67, 1939, pp. 32, bibl. 16.

In the present paper an account is given of the histological abnormalities and the changes which occur in the banana plant during the incubation period of the bunchy-top virus. The histopathology is compared with potato leaf roll and curly leaf of sugar beet and found to be very similar. The argument is illustrated with 30 microphotographs.

717. ANON. 634.771-2.73

Substitute bunch covers in banana rust thrips control.

Qd agric. J., 1940, 53 : 216-7.

The use of paper tubes is advocated as covers for banana bunches in thrips control in Queensland in place of hessian, now difficult to obtain. These tubes have already been used successfully in winter to counteract sun scald and cracking and to promote better filling of the fruit. Trial investigations have shown thrips control by means of the paper bag to be almost as efficient as with hessian. The tubes must be made of strong paper with sewn rather than gummed seams and large enough to take the mature bunch without pressure. The tube would be fitted to the bunch as soon as thrown and the weekly dustings of nicotine applied through the lower opening for the next 3 weeks. The dates of bagging should be written on the tubes to enable the grower to see at a glance which bunches require dusting and the approximate date for harvesting. No time is thus wasted examining half-mature bunches. When a bunch is nearing maturity a few leaves can be pulled down to assist in finding it again during later cutting rounds.

718. SIDERIS, C. P., KRAUSS, B. H., AND YOUNG, H. Y. 634.774 : 581.192

Distribution of nitrogenous and carbohydrate fractions and other substances in exposed and covered pineapple sister shoots.

Plant Physiol., 1940, 15 : 225-55, bibl. 35.

719. HOLTUM, R. E. 635.1/7

Green vegetables.

Mag. Malay. agri. hort. Ass., 1940, 10 : 18-9.

A number of vegetables not commonly seen but worth cultivating in the home garden in the tropics, if only for the sake of change, are discussed. These are sword beans, four-angled beans, dolichos beans, Chinese cabbages and mustards, bayam (*Amaranthus* family), water convolvulus (allied to the sweet potato), Ceylon spinach, young leaves of tapioca and one or two others of which the vernacular names only are given. The parts of the plant to be utilized are indicated. Scientific names are not mentioned.

720. ROSEDALE, J. L. 635.1/7

Vegetables and human nutrition.

Mag. Malay. agri. hort. Ass., 1940, 10 : 23-6.

The nutritional value of vegetables commonly grown in the tropics is discussed. Tables of their vitamin contents are given.

721. FURTADO, C. X. 633.689

The Malayan keladis and other edible aroids.

Mag. Malay. agri-hort. Ass., 1940, 10 : 11-7.

Colocasia esculenta, keladi or taro, is recommended as a tuber-producing crop which deserves more scientific attention than it has so far received. This it is now receiving in America but not in the Old World. Its comparative lack of popularity is here attributed to the fact that some small extra trouble is needed in its preparation to eliminate an acid principle due to minute needle-like structures which are crystals of calcium oxalate. In the cultivated races heat in the forms of frying, steaming or boiling counteracts the acidity while with other races boiling in a separate water before cooking may be necessary; the acidity lies in the thin outer layer of the tubers which should therefore be peeled off. Storing for 2 or 3 weeks after digging in a dry place also reduces the acidity. Should the acidity be accidentally tasted thick syrup of sour lime or tamarind or solid tamarind with or without salt or even bicarbonate of soda will allay it. The juice of this and related plants makes an indelible stain on cloth. A few hints on cooking it to best advantage are given. There are now many varieties of taro with different characteristics as regards cultural requirements, form, colour and shape of tubers and even cooking requirements. Three other cultivated aroids are discussed, and there is a descriptive key to

them. The author is now engaged in studying the many Malayan varieties of keladi with a view to framing a complete key and providing some notes on their peculiarities.

722. RODRIGO, P. A. 635.35

Further acclimatization studies on cauliflower.*

Philipp. J. Agric., 1939, 10 : 403-11, bibl. 1.

During 1934-39 18 varieties of cauliflower were tested at Malate, Manila, Early Patna being used as the standard. They were imported from U.S., Great Britain, India and F.M.S. Of them only 7 varieties were able to produce heads. The yield of these varied from 143-4,776 lbs. per acre and their period of maturity (from sowing to harvest) from 77-133 days. Of the 7 only 2 compared favourably with Early Patna. Both from India, they were Early Market, yielding 4,776 lbs. per acre based on 5 cultures with an average heading of 94.7%, and Early Benares giving 2,419 lbs. per acre based on 7 cultures and a heading of 67.8%. In comparison Early Patna yielded 3,534 lbs. per acre based on 8 cultures with a heading of 84.9%.

723. FURTADO, C. X., AND HOLTUM, R. E. 635.659

Long beans.

Mag. Malay. agri-hort. Ass., 1940, 10 : 20-2.

There are several varieties of long bean (*Vigna sinensis*) of which the prostrate varieties are known as cow pea. In this article the Chinese variety grown in Singapore is compared with the very long variety grown by the Malays. Apart from the differences in pod length the two kinds are quite distinct in leaf characters and show some difference in the flower. The long Malay variety is superior in flavour but less often seen on the market probably because it is more trouble to grow on account of the need of supporting its pods. Recipes are given for cooking this bean.

724. PAL, B. P. 633.491

A note on the varieties of potatoes grown in India.

Emp. J. exp. Agric., 1940, 8 : 80-4, bibl. 4.

A collection of 300 samples of potatoes obtained from different parts of India and subsequently identified at Ormskirk showed that the number of true varieties cultivated in India is few and that most of the present commercially important varieties in the plains represent old and possibly unidentifiable varieties. Three of the most generally grown varieties are described. Work on breeding potatoes suitable for Indian conditions is in progress.

725. BAKER, R. E. D. 635.64

Notes on the diseases and fruit rots of tomatoes in the British West Indies.

Trop. Agriculture, Trin., 1939, 16 : 252-7, bibl. 11.

STORAGE.†

726. POWELL, A. 664.85

Cool storage of fruit. Orchard storage as a means of holding surplus supplies.

N.Z. J. Agric., 1940, 60 : 126-8.

Systems of orchard storage of fruit are described. One method consists of a system by which the air is drawn from the storage chamber by a fan and forced through a spray room where its temperature is reduced by mist spraying with cool artesian water. By this means the temperature can be reduced to within a few degrees of the water temperature which is usually from 53-55° F. Another system consists of surrounding the cases with a framework of some perforated cloth, here called scrim, or lining the walls of the store with it under a galvanized iron roof, which covers a false ceiling of iron trays or plates, spaced for convectional air movement.

* For other articles on cauliflowers in the tropics, see *Ibidem* 1934, 6 : 115-27; *Trop. Agriculturist*, 1933, 81 : 91-4; *H.A.*, 3 : 516 (5 lines); *Trop. Agriculture, Trin.*, 1936, 13 : 218-20, *H.A.* 6 : 885 (12 lines).

† See also 522.

Water is run continuously over the trays and saturates the scrim sides of the chamber. Air circulation is aided by an electric fan which may also be used for drawing the cool night air into the cooling chamber.

727. CARNE, W. M. 664.85.11

Australian apples.

Pamphl. Coun. sci. industr. Res. Aust. **95**, 1940, pp. 55.

Reports by Government officers on the condition of Australian apples in United Kingdom markets, and experiments on the storage capabilities of certain varieties in Tasmania, have been reviewed. It is concluded that a better out-turn of exported or locally stored fruit will result if the following conditions are fulfilled:—That apples are picked within more restricted periods than at present. That picking and storage are related to the size and maturity of the crop on the individual trees. That the fruit to be cool-stored or exported is in most cases cooled within seven days of picking. That the export of any variety is confined to a limited period. That reasonable conditions of storage are available in cool stores and refrigerated ships. Suitable dates before which varieties should not be picked are given. Picking periods are recommended for certain Tasmanian varieties. Recommendations are made for the picking and handling of light crop fruit. [Author's summary.]

728. NELSON, R. C. 664.85.11.035.1 : 547.313.2

Quantitative study of the production of ethylene by ripening McIntosh apples.

Plant Physiol., 1940, **15** : 149-51, bibl. 5.

The rate of ethylene production in the McIntosh apple begins to increase rapidly after the onset of the climacteric, and reaches a maximum several days later than the respiratory maximum. Evidence is presented to show that, as in the banana, ethylene is consumed during the ripening process in McIntosh apple. [Author's summary.]

729. HALL, E. G. 547.313.2 : 634.3 + 635.64

Ethylene gas.

Agric. J. N.S.W., 1940, **51** : 98-101, 143-5, bibl. 7.

The methods of using ethylene gas to colour (not ripen) citrus fruits and to hasten the ripening of tomatoes are described from the point of view of the grower who might wish to treat his own fruit. Tomatoes so treated are usually late ones, which, untreated, would only ripen slowly and with poor colour and flavour. Tomatoes so treated are better in colour and flavour than if picked green and ripened in storage, provided they are fully mature as regards size. There is much useful information assembled in this article.

730. DECOUX, G. J. 664.85.3 : 547.314.2

La maturation et la coloration artificielles des agrumes. (Colouring citrus fruits with gas.)

Fruits Primeurs, 1940, **10** : 69-73, bibl. 10.

Acetylene gas is thought to be a better colouring agent for unripe citrus fruits than ethylene, on account of the lower susceptibility of fruits treated with it to external disease. Its action is, however, slower.

731. BRATLEY, C. O. 664.85.11 : 632.42

Development of scab on stored apples 1938-9.

Phytopathology, 1940, **30** : 174-8.

A not altogether successful attempt to correlate scab incidence with weather conditions.

732. TILLER, L. W., AND COOPER, E. R. 664.85.11 : 632.19 : 537.531
X-ray detection of mouldy-core in the Delicious apple.
N.Z. J. Sci. Tech., 1939, 21 : 168A-9A.

Investigations have now shown that an appreciable amount of the trouble due to mouldy core in the apple escapes detection even after the most careful scrutiny by X-rays and that the maximum attainable speed of X-ray examination is greatly below that which would enable the process to be economically applied in commercial practice.

733. DONEN, I. 664.85.22 : 581.192
The role of sorbitol in the carbon-metabolism of the Kelsey plum. I. Changes in chemical composition during growth and storage.
Biochem. J., 1939, 33 : 1611-20, bibl. 12.
 DONEN, I. AND ROUX, E. R. 664.85.22 : 581.192
II. Relation of carbohydrate and acid loss to CO₂ production in stored fruit.
Ibidem, 1939, 33 : 1947-56, bibl. 9.

In the first of these articles experiments are described tracing the accumulation of sorbitol during growth and the changes that take place in the respirable material of the Kelsey plum on storage at 13° and 25° C. In the second a comparison is made of the carbon lost as sorbitol, sugar and acid with the carbon given off as CO₂ by Kelsey plums stored at 13° C.

734. SMITH, W. H. 664.85.22 : 632.19
Further observations on physiological breakdown in stored plums.
J. Pomol., 1940, 18 : 74-87, bibl. 8.

Further quantitative experimental evidence is presented in support of the view that physiological breakdown in English grown plums during storage may be resolved into two distinct types—"jellying" and "internal browning", arising from different causes. When stored for periods of from 3 to 5 weeks, or a little longer over a wide range of temperatures, Victoria plums behaved in a manner similar to that previously described for the variety Monarch, least breakdown occurring at about 34° F., a temperature at which jellying and internal browning were both approaching minimum values. Certain treatments produced opposite effects on the development of jellying and internal browning:—The advance of jellying in Victoria plums was accelerated, while internal browning was reduced, by fuller maturity at picking time. Internal browning was checked by an intermediate exposure for 4 days to a temperature of 65° F., in the middle period of 35 days' storage at 31° F. Jellying was slightly increased by this treatment. Pre-storage treatment of Monarch plums with ethylene checked internal browning at 31° F., but induced jellying. A gas-mixture containing 2.5% carbon dioxide +2.5% oxygen +95% nitrogen induced internal browning at 37° F., but checked jellying. [Author's summary.]

735. MATSUMOTO, K. 664.85.25
Studies on the physiological changes in peaches during handling and railroad shipment.
Mem. Coll. Agric., Kyoto 46, 1939, pp. 79, bibl. 87.

In view of the fact that in sunlight fruit temperatures are generally above those of the air the best time for picking as regards fruit temperature is the early morning. If picked in the late afternoon fruit cools better spread in a shady cool place overnight than packed at once. The rate of precooling of fruit in cold storage is at first rapid but then drops. Respiratory activity during the growing period was measured in the studies here described mainly by a modification of Magness and Diehl's design. The rate of growth and change in sugar content were studied. Considering correlatively the rate of fruit growth, the intensity of respiration and the change in concentration of reducing and non-reducing sugars in peaches, the presence of a physiological turning point in the life of peaches was recognized. The occurrence of this may vary with variety and cultural treatment. It was found that fruit once stored in a refrigerator respire at an abnormally higher rate after withdrawal from cold store than fruit not subjected to low temperature. The shipment was made over 922 miles with Hakuto peaches, which were divided

into 4 lots as follows :—(1) Precooled fruit, shipped in an ice-cooled refrigerator car. (2) Non-precooled fruit shipped in an ice-cooled refrigerator car. (3) Precooled fruit shipped in an ordinary freight car. (4) Non-precooled fruit shipped in a ventilated freight car. The temperature of fruit and air in the car varied according to method of shipment. Maturity during transit was determined by observations in general appearance and by the hardness recorded by a pressure tester. Samples of air surrounding the fruit were analysed to determine the CO₂ and O₂ content. The total concentration of CO₂ and O₂ was from 20 to 21% and remained nearly constant throughout. Spoilage of fruit on arrival was negligible. In 5 days' storage afterwards spoilage was considerable in every lot; in general lot No. 1 showed the least and was followed by lots 2, 4, and 3 in that order.

736. ANON. 664.85.872.037

Preliminary report on cold storage experiments with grapes (1938) [in Palestine].

Agric. Suppl. Palestine Gaz. 39, 1939, pp. 164-8.

One year's experiments indicate that cold storage of Palestinian grapes can be successfully carried out. A temperature of 0.5° C. and air humidity of 85% were found suitable. Certain varieties, Dattier de Beyrouth and Dabugi, kept well thus stored for over 7 weeks. Individual wrapping of bunches was found preferable to no wrapping and to packing in cork or sawdust. There were indications that grapes from mountainous or unirrigated areas kept better than others.

737. BARGER, W. R. 634.62 : 664.85.62

Handling and storing small lots of dates at home.

Circ. U.S. Dep. Agric. 553, 1940, pp. 12.

There are directions for small date-growers on the handling of small lots of dates by methods and inexpensive equipment readily available in the home. Notes appear on types of date, varieties, grading, ripening, harvesting, equipment, curing, insect control, packing, storage and food value of dates.

738. WARDLAW, C. W. 664.85 : 551.56

Storage of tropical fruits.

Nature, 1939, 144 : 178-81.

The storage requirements of a number of tropical fruits as revealed through the work of the author at the Low Temperature Research Station, Trinidad, are briefly discussed. The fruits dealt with are banana, lime, grapefruit, avocado, mango, papaw, tomato. [Further details can be obtained from the published work of Dr. Wardlaw which has been fully abstracted in past numbers of *Horticultural Abstracts*.]

739. PALILOV, N. A. 664.84.25

Cold storage of seed onions. [Russian.]

Vegetable Growing, Moscow, 1939, No. 10-11, pp. 31-3.

The normal storage temperature for seed onions in U.S.S.R. is 18° C. To maintain this is expensive and some 30% of onions are lost yearly owing to dry conditions in the store room and to decay. Between 1934 and 1939 large-scale cold storage trials were carried out at the Leningrad regional vegetable research station with seed onions of three common Russian varieties. The following recommendations are made :—1. Seed-onions must be sized into two groups, i.e. bulbs with a diameter not exceeding 1.8 cm. (group 1) and those over 1.8 cm. (group 2) and stored separately. 2. Group 1 onions are dried at 25-35° C. with adequate ventilation arrangements for 10-20 days, i.e. until the external scales become dry. 3. After drying, the temperature in the store room is lowered to 18° C. and this is maintained until the cold weather begins. Air humidity should be 55 to 75%. With the onset of cold weather heating of the store room ceases, temperatures of -1° C. to -2° C. being maintained until the arrival of warm weather. Air humidity is reduced to a minimum and should not exceed 80% during warm spells. During prolonged periods of warm weather and increased moisture store rooms should be heated again

and the atmosphere maintained at 18° C. During cold weather the storage atmosphere must not be allowed to fall to below -4° C. 4. As it becomes warmer in spring the store room temperature should be raised in the course of 2 to 3 days to 20 to 22°. Before being sent to growers the seed onions should be held at this temperature for 20 to 25 days. 5. Group 2 onions must be stored at 18 to 20° C., storing at -2° C. to -3° C. being only possible where maintenance of temperatures below zero can be provided for without a break. The above temperatures should not be employed for a period exceeding 75 days, after which and until sowing seed onions of group 2 should be kept at 18° to 20° C.

740. WHITACRE, J., HAWTHORN, L. R., AND YARNELL, S. H. 664.84.63
Lengthening the storage period of cucumbers.
Bull. Tex. agric. Exp. Stat. 576, 1939, pp. 23, bibl. 3.

Storage experiments extending over five seasons were made with cucumbers grown at Winter Haven and at the College Station. Of the eighteen treatments tried, three were found equally satisfactory for preservation of weight, colour, turgidity, texture, flavour and palatability of cucumbers held in storage at 40° F. In one of these fresh cucumbers were wrapped individually in moisture-proof cellophane; in another they were packed unwrapped in large light-weight wood or corrugated paper containers lined with moisture-proof cellophane; in the third the unwrapped fruits were placed in a refrigerator humidifier. For 8 to 10 days cucumbers so treated were as good as fresh ones.

741. SHEPARD, H. H. 664.82/6 : 632.7
Insects infesting stored foods.
Bull. Minn. agric. Exp. Stat. 341, 1939, pp. 42, bibl. 53.

These are notes on the biology and control of the common insect pests of stored foods in the United States, including those of spices, dried fruits, nuts and their products.

742. RUBIN, B. A. 664.84
Biochemical principles of vegetable storage. [Russian.]
Biochemical Institute of the U.S.S.R. Academy of Science, 1939, pp. 119.

PACKING, PROCESSING AND PLANT PRODUCTS.

743. GREGORY, J. H. 634.771-1.564
The packing of Lady Finger bananas.
Qd agric. J., 1939, 52 : 678-80.

A short illustrated description of a method of packing the delicate Lady Finger banana. Packing this banana, as is the Australian custom with the Cavendish type, broken into single fingers, results in a sharp price reduction. This paper shows how to pack in hands. The type of pack is governed by the size of the hands of which three are recognized. These 3 packs are all illustrated.

744. WIDMER, A. 663.813
Zur Frage der Klärung trüber, pektinreicher Birn- und gemischter Obstweine.
(Clearing cloudy fruit juices.)
Schweiz. Z. Obst- u. Weinb., 1939, 48 : 178-84.

Swiss experiments showed that cloudy pear juices and mixed juices containing little tannin but plenty of pectin could be cleared, where a change in their composition was undesirable, by the enzymic action of "Filtral". Where the use of the separating juice was not objected to, it could be used equally effectively. In seasons when good quality separating juice is available it will be cheaper to use it than "Filtral".

745. WIDMER, A. 663.813 : 634.11
 Weshalb kommt der enzymatischen Klärung von süssen Apfel- und gemischten
 Obstsäften so grosse Bedeutung zu ? (**The importance of enzymic clarification
 of apple and mixed juices.**)
Schweiz. Z. Obst-u. Weinb., 1939, 48 : 405-9.

The great importance is shown of the enzymic method of clearing juices, particularly where, owing to the high pectin and mucin content of the juices, other methods fail.

746. WIDMER, A. 663.813
 Zur Konzentratrfrage. (**The use of concentrates in fruit juices.**)
Schweiz. Z. Obst-u. Weinb., 1940, 49 : 26-30.

While fully admitting the unfavourable effect of an admixture of concentrate juices in Swiss juice and wine-making industry, where high quality products are concerned, it is not denied that occasionally concentrates may be used with advantage to stabilize certain juices suffering from unfavourable composition or to improve the flavour of poorer quality fruit wines.

747. SCHW, H. 663.813
 Der "Sündenbock" Konzentrat. (**The use of concentrates in fruit juices.***)
Schweiz. Z. Obst-u. Weinb., 1939, 48 : 483-90.
 SCHELLENBERG, H.
 Der "Sündenbock" Konzentrat.
Ibidem, 48 : 499-500.

In the first article Schellenberg is severely criticized for his lack of understanding in an earlier paper† of the importance of concentrate fruit and grape juices in wine and unfermented juice industry. The advantages of such concentrate juices are pointed out. In the second paper Schellenberg refutes the claim that concentrate juices can give juices and wines of equal quality to those obtained from non-concentrate juices, pointing to changes in flavour and composition during the concentration process and storage.

748. JENNY, J. 663.813
 Die Süssmosteinlagerung unter Kohlensäuredruck und dessen erforderlicher
 Druck. (**Fruit juice storage under CO₂ pressure.**)
Schweiz. Z. Obst-u. Weinb., 1939, 48 : 438-42, 457-62.

Avoidance of fermentation depends to a very great extent on CO₂ concentration, juice properties, yeast and temperature. Concentration depends on pressure, absorbing capacity of the juice and temperature. Poorly fermenting juices need lower CO₂ concentrations. The absorption capacity increases with lower cellar temperatures. Concentration changing with temperature, the latter must be sufficient, but should not be allowed to become excessively high for any length of time in the cellar. Juices with inadequate CO₂ content are apt to ferment until the concentration has become saturated with CO₂. Juices that have not been treated with CO₂ but are in sealed containers can only ferment until a CO₂ concentration is reached which inhibits further fermentation. A formula is given for calculating maximum pressure. In practice the pressure will be significantly lower.

749. WIDMER, A. 663.813 : 632.111
 Ueber das Verhalten von Obstsüssmosten ungleicher Klärungsart bei starker
 Frosteinwirkung. (**Turbidity of fruit juices caused by frost.**)
Schweiz. Z. Obst-u. Weinb., 1939, 48 : 8-11.

Swiss investigations showed that juices that have been made stable through pasteurization remain unaffected by cold temperatures owing to the colloids having been released through the heating of the juice and to the fact that natural enzymes have been rendered harmless. This is

* Literally, Concentrates, the scapegoat.

† "Schlussfolgerungen der Kellerkontrolle bei Zürcherischen Grossmostereien," *Ibidem*, 48 : 192-6.

not the case with tart pear juices or other juices that have undergone either excessive or inadequate clarification. Such juices when exposed to cold show turbidity by reason of the presence of tannin and albumen.

750. SIPPLE, H. L., McDONELL, G. H., AND LUECK, R. H. 663.813 : 634.11

The canning of apple juice.

Fruit Prod. J., 1940, **19** : 167-71, 180-3, 187, bibl. 11.

Procedures developed for the commercial production of canned apple juice, clarified and unclarified, are described and compared. Colloidal bentonite was found an efficient clarifier. Deaeration, flash-sterilization and prompt and thorough cooling of cans after hot closure were shown to promote the original apple aroma and flavour. The juice of fully mature apples was found definitely superior to that of immature or over-ripe apples. Plain tin plate cans were found unsatisfactory. Deaerated flash-sterilized juice, packed in type L coke tin plate suitably enamel lined, remained in satisfactory condition after 12 months' storage at room temperature. [From authors' summary.]

751. PETERSEN, A. 663.813 : 634.11

Fabrikation af Ablemøst. (**Apple juice making.**)

Dansk Frugtavl, 1939, No. 8, pp. 608-11.

STAAL, W.

634.11-1.57

Fabrikation af Æblepulp. (**Apple pulp production in Denmark.**)

Dansk Frugtavl, 1939, No. 9, pp. 637-40.

752. NOLTE, A. J., AND VON LOESECKE, H. W. 663.813 : 634.323

Possibilities of preparing lactic acid from grapefruit juice.

Fruit Prod. J., 1940, **19** : 204-5, 216, 220.

A method for preparing calcium lactate and lactic acid from cull grapefruit juice is described. Yields of lactic acid ranged from 71 to 84% based on sugar converted. Recovery of calcium lactate averaged 6% based on weight of juice, while recovery of 50% lactic acid averaged 7.1%. Calcium citrate is obtained as a by-product at the rate of 15 lb. per ton of fruit.

753. ATKINSON, F. E. 664.8.036.5

Operation and construction of domestic canneries in British Columbia.

Publ. Canada Dep. Agric. **648**, 1939, pp. 20, being *Fmrs' Bull.* **75**.

These are practical instructions for the operation of canning plant which is midway in scope between home and commercial canning. Notes are given under the following headings:—Adequate finances, planning, equipment, operation of equipment, instruments, the process of canning, process details for acid fruits and for vegetables, minimum weights, varieties for canning and Government inspection.

754. ATKINSON, F. E., AND STRACHAN, C. C. 581.192 : 634.1/7

Chemical constituents of some fruits grown in British Columbia.

Sci. Agric., 1940, **20** : 321-8.

A large number of analyses made in British Columbia are set out here with notes of the bearing of these figures on processing, etc. The figures refer to apple juice of many varieties, places and seasons; peaches and apricots; cherries; Italian prunes; grape juice; black and red currants; strawberries and raspberries.

755. BECKER, J. 634.22 : 581.192

Adatok fontosabb szilvafajtáink kémiai összetételéhez. (**The chemical composition of the fruits of 4 common Hungarian plum varieties.**)

Bull. roy. Hungarian hort. Coll., 1939, **5** : 44-52.

756. HOAR, T. P., MORRIS, T. N., AND ADAM, W. B. 664.85.036.5

The influence of the steel-base composition on the rate of formation of hydrogen-swells in canned-fruit tinplate containers. Part I.

Reprinted from *J. Iron and Steel Inst.*, 1939, 2: 55P-94P.

The rate of formation of hydrogen-swells in packs of typical British canned fruits has been studied in relation to the composition of the steel base of the tinplate by means of statistically planned canning experiments. A "random sample" of the tinplate at present on the British market has been used, and each can has been analysed for sulphur, phosphorus and copper after forming a hydrogen-swell in storage under defined conditions. The corrosion rate and corrosion potential of the steel base of each can, in citric acid, have also been measured. The results are correlated by the standard methods of statistical analysis. The present paper gives results for packs of blackcurrants, white cherries, gooseberries, loganberries, Pershore plums, raspberries and strawberries in double-lacquered cans. It is shown that the rate of formation of hydrogen-swells is significantly correlated with the corrosion rate of the steel base in citric acid. For several fruits the rate of swell-formation is lowest when the steel base has a high (up to 0.2%) copper content while for others it is lowest when the phosphorus content is lowest; in general, it is suggested that the use of high-copper (0.16-0.22%) low-phosphorus (0.03-0.045%) steel should roughly double the expected life of packs of these fruits, on the average. Correlation between the composition variates themselves and the cathodic efficiency of the steel for hydrogen evolution have been discovered, and are discussed in relation to the rate of formation of hydrogen-swells. [Authors' summary.]

757. BEACHAM, L. M. 664.85.13.036.5

An objective method for measuring grittiness in canned pears.

J. Ass. off. agric. Chem., Wash., 1939, 22: 766-8.

A method is described for separating and determining in canned pears grit cells retained on a 30-mesh screen. A table shows the percentage by weight of such grit cells in samples of canned Bartlett, Kieffer and Pineapple pears and a comparison of the grit cells (per cent.) with an organoleptic examination of such pears.

758. ANAGNOSTOPOULOS, P. T. 634.63-1.56

Greek olive conserves. [Greek, English summary 2 pp.]

Horticultural Research, Athens, 1939, 4: 225-40, 301-35.

Greece exports yearly some 12,000,000 kg. of preserved olives. The characteristics of the olives and olive varieties used for this purpose are discussed. The fungus *Phoma Oleae* is apt to prevent satisfactory preservation by natural means. Its attacks result in the destruction by hydrolysis of the glucoside, oleuropein, and in the production of sweetness in the fruits which assume a reddish brown colour and are subsequently sold locally as early sweet conserves. These products can also be salted and kept satisfactorily in oil for some time.

In artificial processing the first procedure is the elimination of the bitter taste present in fresh olives due to the above glucoside. This is done by immersion in water baths or brine, or by treatment with lye or with dry salt.

The author summarizes his experiments on different artificial methods and the following notes are taken from his summary.

The chief varieties used are the Conservolea and the Calamata. The water bath method for destruction of the glucoside is sometimes used for these two varieties. The usual commercial method adopted is that of immersion in brine of 5-15° Bé. The use of lye for the purpose is not common in Greece, but the author has successfully experimented with this common Californian method and he notes that repeated lye treatment for ripe fruits followed by pickling in 10% salt brine gave excellent products in his experiments. The results of different modifications of the process and the times taken to produce optimum results by the different treatments are noted. It is remarked that the final packing of the treated fruits in a mixture of 2 parts wine vinegar, 1 part olive oil and 1 part brine (13% salt) gave excellent results.

759. LEGGERI, G. 631.57 : 634.23 + 634.51
 L'utilizzazione industriale dei " noccioli di ciliege " e dei " gusci di nocciuoie ".
 (**Making use of cherry stones and walnut shells.**)
Ortofrutticoltura ital., 1939, 8 : 189-90.

By distillation of cherry stones at 420° C. and walnut shells at 390° C. and further treatment here described it is found possible to produce a fuel gas, methyl alcohol and a carbon which can be used for the production of active carbons. The processes are very briefly described.

760. CHILD, R. 634.61 : 665.353.6
Coconut oil and whale oil.
 Reprinted from *Ceylon Trade J.*, 1939, Vol. 4, pp. 4.

The two commodities, coconut oil and whale oil, are compared with reference to their properties, industrial utilization and production costs.

761. HÖHN, E. 664.85.047 + 664.84.047
 Das Dörren von Obst und Gemüse. (**Drying fruits and vegetables.**)
Schweiz. Z. Obst- u. Weinb., 1939, 48 : 371-98.

Experiments in Switzerland involved technical tests of the different types of apparatus used for drying pears, apples and beans and comparative studies of the dried products of different varieties. The results of these are given here.

762. SMITH, H. F. 633.912 : 678.11
Specific gravity of latex and of rubber.
J. Rubb. Res. Inst. Malaya, 1940, 9 : 218-47, bibl. 27, being *Commun. J.R.R.I.M.* 244.

The purpose of the paper is to direct attention to methods of evaluating the values of specific gravity of rubber and serum of *Hevea brasiliensis* with attention to possible effects of varying soils, clones, temperatures and physico-chemical conditions. Problems also reviewed are (a) the calculation of a conversion table for different ways of expressing dry rubber content, (b) the estimation of specific gravity of latexes ammoniated in different ways; (c) the estimation of dry rubber content from the specific gravity of latex in water mixtures. [From author's summary.]

763. RAMIRO, M. P. 633.525.1
A method for degumming and bleaching decorticated ramie fibre.
Philipp. J. Sci., 1939, 70 : 411-21, bibl. 14.

A new method for degumming and bleaching decorticated ramie fibre is suggested as being efficient in producing a high-class fibre suitable for use in the Philippines. *Degumming.* The fibre was digested in 2 stages of 1.5 hours each in a dilute solution of caustic soda and ammonium carbonate in stage 1 and caustic soda and sodium sulphate in stage 2. *Bleaching.* Sodium hypochlorite was used in bleaching the degummed fibre. The container of fibre and solution was placed in a bath of 40° C. and maintained at this temperature until the bleaching liquor was completely exhausted. The fibre was then washed and dried. *Softening.* The degummed fibre has to be softened to render it suitable for spinning. This is done by treating the purified fibre for from 1-2 hours with an emulsion of soap solution and kerosene.

764. SCOTT, M. J. 634.11-1.57
Apples as a pig feed.
N.Z. J. Agric., 1940, 60 : 29-30.

The utilization of waste or reject apples as pig feed has been investigated in New Zealand. It is shown that if adequate supplementary feed is also provided and the pigs kept under good conditions a profit of from 6d. to 1s. per case may be expected from this class of apple. As an example one sow and a litter of 7 bacon pigs consumed from December to August 120 lb. molasses,

1,065 lb. meat meal, 420 lb. barley, 21,280 lb. apples (532 cases). Deducting the cost of purchase of feed from the value of the pigs produced the return for the apples fed was 6d. a case. In another case from June to April one sow and a litter of 7 baconers showed a return of 9d. a case, good grazing having been available during the summer and the need for apples being therefore reduced. Labour costs are not mentioned.

765. GANAPATHY, C. V., AND SASTRI, B. N. 634.651 : 581.192
The nature of papain.
Biochem. J., 1939, **33** : 1175-9, bibl. 10.
 KRISHNAN, P. S., AND KRISHNASWAMY, T. K. 635.615 : 581.192
Proteins and other nitrogenous constituents of water melon seeds (*Citrullus vulgaris*).
Biochem. J., 1939, **33** : 1284-90, bibl. 19.
 ROBERTS, E. A. H., AND SARMA, S. N. 633.72-1.56
The fermentation process in tea manufacture. 1. The role of peroxidase.
Biochem. J., 1938, **32** : 1819-28, bibl. 17.
 ROBERTS, E. A. H.
The fermentation process in tea manufacture. 2. Some properties of tea peroxidase. 3. The mechanism of fermentation.
Ibidem, 1939, **33** : 836-42 and 842-52, bibl. 12.
 HARRISON, C. J., AND ROBERTS, E. A. H.
The fermentation process in tea manufacture. 4. Tea tannin and its fermentation products.
Ibidem, 1939, **33** : 1408-20, bibl. 21.
 ANTENOR, C. S. 633.73-1.56
A comparative study of the native and West Indian methods of preparing coffee berries for the market.
Philipp. Agric., 1940, **28** : 707-23, bibl. 5.

NOTES ON BOOKS AND REPORTS.

766. THOMPSON, H. C. 635.1/7
Vegetable crops.

McGraw-Hill, London, New York, 1939, pp. 578, bibl. 452, 33s.

The third edition of this standard work on vegetable production in America contains all the information that has made the previous edition so valuable, revised, in some cases rather completely, as a result of the investigations of the last nine years. The author is Professor of Vegetable Crops at the New York State College of Agriculture, Cornell, and contrary to the opinion so firmly held by the redoubtable Mr. Squeers, believes that in college and university teaching stress should be laid on principles and science rather than on actual practice, which, he thinks is never enough to allow the student to attain proficiency. In other words he distinguishes the science of horticulture from the art thereof and in this book science takes premier place, for without knowledge of the principles expounded here art in these competitive times will avail little. To indicate the scope of the book we mention a few chapter headings:—Classification of vegetables; soils and soil preparations; manures; soil improving crops; commercial fertilizers and lime, seeds and seed growing. In turn cultivation in all its branches including disease control is fully gone into and there are some interesting and useful pages on storage in the field and in buildings. The remaining chapters deal with classified groups of vegetables, e.g. salad crops, root crops, etc., and these groups are again resolved into their respective constituents and full information for growing each is given. As an instance of the

thoroughness with which this is done the section on the carrot is crossheaded as follows:—history and taxonomy; soil preference; manures; planting; environmental factors on growth and colour; thinning; cultivation; varieties; carrot rust fly; harvesting; storage. All other vegetables are treated on similar lines. There is no doubt that this is an extremely useful work for the commercial grower not only in America but in any temperate or subtropical country.

767. TURNER, W. I., AND HENRY, V. M. 663.61 : 581.084.1
Growing plants in nutrient solutions.
 John Wiley, New York; Chapman & Hall, London, 1939, pp. 154, bibl. 54,
 18s.

The science of hydroponics or methods of growing plants to the fruiting stage in nutrient solutions, formerly confined to physiological experiments in the laboratory, is receiving some attention from commercial growers. The authors of this work, which is really a fairly complete handbook to the commercial systems,* are frankly enthusiastic and in their preface claim that the method is thoroughly practical and has some very definite advantages over ordinary soil culture. It is, however, at present only in the United States where these methods are receiving a serious trial from a number of established growers who have devoted a portion of their glass-house range to the purpose. Their addresses are given. In successive chapters are described the conversion of glasshouses from soil to nutrient culture and the installation and construction of plant, much of which may be done by the employees, but it is emphasized that as regards the mechanical equipment, motors, pumps and electrical controls only the very best is good enough if freedom from trouble, probably at a critical time, is to be assured. A description is also given of a small scale nutrient equipment with which the "skeptical or timid individual" can make a trial run. To stigmatize as timid the man who these days hesitates to expend a great many dollars and much precious greenhouse space, without previous experiment, on a system which is practically untried and may quite easily be "messed up" (there are plenty of snags) is rather unkind. Possibly "cautious" would have been more polite! However, that by the way. The means of avoiding a number of possible troubles are discussed. One of the most important of these is excess or deficiency of some element in the nutrient solution and it should be noted that the balance, mainly the nitrogen/potassium ratio, changes with the season. But deficiency or excess can be diagnosed by the appearance of the plant and to this end several keys to deficiency symptoms from the published work of investigators are given. In brief it can be said that the method has great possibilities for those able to deal with it scientifically, but that success will not come unless the, by no means simple, scientific principles involved are thoroughly understood and acted upon; for this reason alone it will long be beyond the reach of the many. Nevertheless the enthusiasm of the authors is inspiring and even to the layman the book is definitely not dull.

768. HUMPHREY JOHN (J. H. DENHAM). 634/5
The skeptical gardener.
 Harrap, London, 1940, pp. 263, 11s.

The theme of the book is the gradual transformation of a derelict farmhouse on the upper waters of the Cherwell into what sounds like a gardener's paradise. This is not a book of garden whimsy but neither is it a solemn treatise on horticulture. It is a record of the author's successes and failures, the manner in which these were achieved and the probable reasons for both, served up in the light and pleasantly sardonic style of which he is a master. And the author, it must be mentioned, is a trained scientist and a horticultural writer of long standing (or should it be sitting?) who, to put it vulgarly but not inappositely, "knows his onions," though his method of dealing with them may not always be conventional. To those who crave a temporary respite from the current topic this book will provide it.

* A list is given of firms in the U.S.A. who supply the necessary requisites.

769. McCANCE, R. A., AND WIDDOWSON, E. M. (MEDICAL RESEARCH COUNCIL.)
613.2 : 543

The chemical composition of foods.

Special Report Series Medical Research Council, 235.

H.M. Stationery Office, London, 1940, pp. 150, bibl. 22, 4s.

In this book particulars of the chemical composition are given of the chief human foodstuffs including the more common fruits and vegetables. As an instance details are given of the composition of apricots as follows:—fresh, fresh including stones, dried, dried and stewed without syrup, and tinned in syrup. The foods are first considered with regard to the edible matter derived in each case from 100 grammes of purchased food and the percentage of water, unavailable carbohydrate, sugar, starch and total nitrogen in that 100 grammes. Next the amount of different elements per ounce is considered as follows:—Protein, fat, available carbohydrate, calories, Na, K, Ca, Mg, Fe, Cu, P, S, Cl, acid-base balance cc. per ounce N/10 acid or N/10 alkali.

In addition figures are given of the available “(non-phytic acid)” phosphorus and the “available” (ionisable) iron in the different foods.

770. GOETZ, O. 631.541.11 : 634.11 + 634.13
Verhalten von Apfel-und Birnenedelsorten beim Umpfropfen zueinander.
(The compatibility of apple and pear varieties when worked on other apple and pear varieties.)
Gärtnerische Verlagsgesellschaft m.b.H., Berlin SW 61, 2nd edit., 1937,
pp. 62, 0-35 RM.

The author gives a long list of apple (194) and pear (140) varieties with notes in each case on the compatibility or incompatibility of other named varieties worked on them. In each case varieties are designated as early or late growers and as strong or weak growers. The author stresses the fact that not only the above growth factors but also environmental and climatic influences play a considerable part in determining compatibility or incompatibility in each case.

771. NIKITA STATE BOTANICAL GARDENS, YALTA. 635.976 + 635.977
Trees and shrubs. I and II. [Russian.]
Trud. Nikita St. bot. Gdns, Yalta, 1939, vol. 22, No. 1, pp. 178, bibl. 74,
and No. 2, pp. 115.

These are detailed taxonomic and geographic descriptions of gymnosperms and some of the angiosperms to be found at the Nikita Gardens. Trees and bushes other than those dealt with here will be described in the two forthcoming numbers of this volume. Both Russian and scientific names are given to plants and varieties of plants.

772. FEILDEN, G. ST. C., AND GARNER, R. J. 631.535/541 : 633/635 : 551.56
Vegetative propagation of tropical and sub-tropical plantation crops.
Tech. Commun. Bur. Hort. Plant. Crops, East Malling, 13, 1940, pp. 99, bibl.
*284, 3s. 6d.**

This Technical Communication is a sequel to T.C.7 which dealt with the vegetative propagation of tropical and sub-tropical fruit crops. The plantation crops considered in the present publication include cacao, coffee, tea, rubber, cinchona and some 50 others. A feature of the earlier publication was the simple line drawings of the different grafting and budding operations referred to in the text. These are reproduced in the present work together with new drawings which show the etiolation method, strap grafting, tongue-inarching, four methods of graft used in topworking, and finally the method of making potting baskets which have proved so useful in tropical propagation work. Each section concludes with a list of articles to which reference can be made for further details.

* Or 4s. 6d. for one copy each of T.C.'s 7 and 13 ordered simultaneously.

773. BRITISH SOUTH AFRICA COMPANY (MAZOE). 634.3
Annual Report Mazoe Citrus Experimental Station for 1937, 1940 ?
 pp. xiii+62, being *Publication 7*.

I. *Superintendent's Report*. In addition to giving a general summary the writer discusses certain other items of horticultural interest. Among these may be noted the successful growth of the Lisbon and Eureka lemon trees raised from California budwood which have begun to fruit. Pyrethrum plantings were adversely affected by white ants. Experiments on geranium spp. give good promise of success; the same applies to tung oil (*A. Fordii*) trials. The trial plantings of peppermint have been abandoned. II. *Entomological review 1937*. The threat of considerable damage from boll worm (*Heliothis armigera*) did not materialize and the activity of red scale (*Aonidiella aurantii*) was at a minimum. Mention is also made of soft scale (*Lecanium hesperidum*) and of false codling. III. *The biology of a tachinid parasite (Sturmia rhodesiensis sp.n.) of the cotton boll worm in Southern Rhodesia*. IV. *Chemist's review of the 1937 and 1938 seasons on Mazoe and Sinoia estates*. The revised fertilizer programmes are now in force on the respective estates and have already given very excellent results. The paramount importance of nitrogen for the promotion of heavy cropping in Valencias has been shown. In addition great improvement has been made in quality by the elimination of hard fruit as the result of borax treatment. V. *Report of the plant pathologist for the year ending Dec. 31st, 1937*. The writer summarizes research work under the following headings:—(1) infection of oranges, (2) dormant or latent infection in citrus fruits, (3) storage tests, (4) maturity tests. Appendixes I and II contain details of rainfall from 1919-37 and of temperature, humidity, evaporation and rainfall with times of harvesting 1929-37.

N.B.—In consequence of the war the issue of further reports is temporarily suspended.

774. DELAWARE. 634.1/7
Annual Report of the Director, Delaware Agricultural Experiment Station for fiscal year ending June 30, 1939, being Bull. 220, pp. 43.

Notes are given of work done on the following, among other, horticultural problems:—control of codlin moth, of oriental fruit moth, of strawberry weevil; physiological dropping of fruit; growth of apples on own roots, on seedling roots and on seedling as compared with Malling II roots; magnesium nutrition of the peach; C/N ratio in apple trees as influenced by various N treatments; peach yellows; sweet potato diseases; bacterial leaf spot of peach; copper sprays for the control of bitter rot in apples.

775. EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE. 634.1/7
Report on the work of the college for the year ending 30th Sept. 1939, 1940, pp. 67.

As regards horticulture it is noted that experiments were undertaken on the following:—spraying; manurial, varietal and pruning trials of raspberries, apples and blackcurrants; injection of apple trees with plant nutrients as a means of diagnosing nutrient deficiencies; broccoli varieties for late cutting; manuring of beetroot; use of plant hormones in propagation. No details are given.

776. HAWAII. 63
Report Hawaii Agricultural Experiment Station for 1939, Honolulu, 1940, pp. 89.

Potatoes. The most effective manner for breaking down dormancy appears to be treatment with vaporized ethylene chlorohydrin at 1 c.c. for each kilogramme of potatoes. The treatment period is from 2-3 days and the potatoes should be stored for 2 weeks before planting. *Papaya*. The ripening process is described and the effects of the sterilization treatment by cold or by heat necessary before entry of fruit into U.S.A. Preliminary experiments showed that the papaya when ripening produces some gas, probably ethylene, which brings about the rapid ripening of bananas. Some experiments with colchicine on young seedlings produced growth of tetraploid character but the plants reverted to normal on being planted out. The best variety by far

grown in the islands is Solo. It will probably improve still further with selection, this method having been found the best way of eliminating certain unfavourable characters such as furrowed fruit or fruit with irregularities on the inside surface of the flesh, making the removal of the seed difficult. *Litchi*. Rooting up to 70% has been obtained by treatment with indoleacetic acid followed by planting in a rooting medium held at 86°-90° F. The cuttings form long brittle roots and are difficult to transplant. In marcotting litchi indoleacetic acid, 2% in lanolin paste, smeared on at a point just above the girdle accelerated rooting. *Macadamia*. In the macadamia the oil content and the insoluble nitrogen content were not found to be inversely related, which is contrary to statements in literature on oil-bearing seeds in general. Variety and stock trials are in progress. The results of foliar diagnosis of chlorotic and non-chlorotic trees are summarized, but no reasons are given for the condition. There appears to be a differential susceptibility to chlorosis among the progeny. *Coffee*. Studies of growth relationships and yield of coffee now point to lateral growth as a relatively accurate means of determining tree response and of predicting yield under normal weather conditions and this will be a useful tool in fertilizer, pruning or other investigations.

777. ILLINOIS (MUMFORD, H. W., Director). 634.1/7
A year's progress in solving farm problems of Illinois.
50th A.R. Ill. agric. Exp. Stat. for year ended June 30, 1937, 1939,
(Horticultural investigations, pp. 263-99).

Among subjects discussed in this report, the lateness of which is due to the death of the director H. W. Mumford, are many of interest to horticulturists. They include:—Wilting caused by use of bordeaux without oil in dry seasons; difficulty of removing cryolite spray; apple soil cultural experiments; fertilizer applications nullified by dry summer; winter injury to apple trees; mahaleb stock outstrips morello in cherry rootstock trial; crown gall in raspberries; cutting asparagus in second year; control of damping off.

778. MADRAS. 634.1/7
Report of Operations Department of Agriculture, Madras Presidency for the year 1938-9, pp. 76 +7, 8 annas.

In G.O. No. 26, 3 January, 1940, which forms the 7 pages at the end, a brief note is given on fruit investigations in the Province at various centres.

779. MADRAS. 63
Report of Subordinate Officers Department of Agriculture, Madras for 1938-9, 1939, pp. 164, Rs. 3-8-0.

780. NATIONAL RESEARCH COUNCIL OF CANADA. 577.15.04
Twenty-second Annual Report 1938-39. [English and French], pp. 22,
 being N.R.C. No. 866.

The most interesting item to horticulturists is the progress made in the practical application of plant hormones. It has been found that the inclusion of minute quantities of these substances in inert dusts stimulates the rooting of cuttings. A commercial hormone powder is now on the market. Procedures for preparing hormones already known are being improved and for the synthesis of new ones such as naphthylacetic acid are being worked out. Costs of production have been greatly reduced.

781. NEW YORK STATE HORTICULTURAL SOCIETY. 634
Proceedings of the 85th Annual Meeting 1940, pp. 401.

This volume contains a number of useful papers on all sorts of fruit problems. See also abstracts 471, 500.

782. NIGERIA. 633/634
Annual Report of the Agricultural Department for 1938, 1940, pp. 46.
 2s.

Items of interest include the following :—Progress is being made towards setting up an oil palm research station at Ekiadolor and sufficient ground has been cleared for quarters and some 40 acres for planting. There are now available in Nigeria some 15,000 useful palms, most of them the progeny of selected parents. The Deli palm imported from the East Indies has so far not proved very successful but trials continue. The problem of sterility in oil palms is being studied. Cacao problems chiefly concern the rejuvenation of forms which have deteriorated and the re-establishment of cacao where it has died out. Successful attempts have been made to produce locally a cigarette tobacco. The yellow ginger strain shows signs of being a great advance on previous products. Manurial and other experiments are being made with it. Fruit species which have received attention in different ways include grapefruit, pineapple, dates, while the possibility of utilizing cull fruit for juice production is being investigated.

783. PENNSYLVANIA STATE HORTICULTURAL ASSOCIATION. 634
Proceedings of the 81st Annual Meeting Jan. 16-18, 1940, being Pa
St. hort. Assoc. News 1940, Vol. 17, No. 1, pp. 101.

Papers of interest to horticulturists in other parts of the world include the following :—Diversification on the fruit farm. Air-cooling the cold storage. New peach varieties. Recent developments of contour orchard plantings in Pennsylvania. The use of contour planting combined with appropriate cover cropping is found to check erosion. Supplementary measures in codlin moth control. Control of internal cork of apples by boron. Under Pennsylvania conditions the following treatment is suggested where apples are affected with internal cork. An application should be made of borax of about $\frac{1}{3}$ lb. per tree for trees under 15 years old, $\frac{1}{2}$ lb. for trees 15-20 years old, and 1 lb. for trees 21 years or more, or two-thirds of this amount of boric acid could be used instead. This should not be repeated until the orchard again produces corky fruit.

784. QUEENSLAND. 634
Report of the Director of Plant Industry (Research) 1939, being
 extracted from the *A.R. Queensland Dep. Agric. Stk for the year 1938-9*, pp. 34.

W. A. T. Summerville makes a report on the Horticultural Section on pp. 22-4. The chief items discussed are as follows :—Deciduous fruits. The little leaf problem has yielded to zinc sulphate spraying in the dormant period. Wither tip of apples is almost certainly due to copper deficiency and definite recommendations will probably be made in the near future. *Bananas*. Manurial trials are in progress at Buderim Mountain. *Citrus*. A fertilizer trial is in progress at Mapleton. Results are expected from the foliicellulosis work at Gayndah, where also soil moisture work is being done. Work on the gumming of lemons will shortly be investigated. *Papaw*. Work is focused on the production of desirable types. Asexual propagation is being studied, the chief problem being to overcome the bacterial and other rots which occur at budding. *Mango*. A field variety trial is about to be undertaken. *Australian nut*. Work is directed to a determination of the possibility of affecting the size or consistency of nut by manuring and to vegetative propagation methods. *Avocado*. An experimental plot of seedlings of the Mexican and Guatemalan races is proposed. *Strawberry*. Selection work proceeds. *Passion fruit*. Fertilizer experiments are in progress. *Date*. Palms of different varieties are being raised at the Biloela Research Station.

785. QUEENSLAND ACCLIMATISATION SOCIETY. 634
The 73rd Report of the Queensland Acclimatisation Society from
1 April 1938 to 31 March 1939, pp. 15.

The present state of crops under examination by the Society is discussed. They include :—avocado, citrus, custard apple, pecan, macadamia, walnut, litchee, mangosteen, olive, mango, papaw, strawberry, date, pineapple, soya, sweet potato, the cover crop, *Crotalaria goreensis*, and others.

786. ROYAL SWEDISH ACADEMY OF AGRICULTURE. 63
 Arsberättelse avgiven den 28 januari 1940 av Akademiens Sekreterare.
 (Secretary's Report for 1939, the Royal Swedish Academy of Agriculture.)
 [English summary 30 lines.]
 K. Lantbr. Akad. Tidsk., 1940, 79 : 38-55.

Among research projects in progress the following may be mentioned :—The effect of frost on clay structure, the humus-forming processes in Swedish soils, the permeability to water of certain soils from the point of view of their draining, the relations of precipitation to ground-water drainage, the intake and assimilation of inorganic nitrogen by plants, problems relating to the quality of peas for human food, the cultivation and improvement of soya beans.

787. SOUTH AUSTRALIA. 634.1/8
Report of Minister of Agriculture of South Australia for the year ended 30th June, 1939 (Chief Horticulturist's report pp. 22-32).

Figures are given of overseas fruit export including a note of apples and pears rejected for export for particular named reasons. As regards investigational work very brief notes are given of work at the Blackwood and Fullarton orchards, at Berri orchard, at the Barossa viticultural station and generally throughout the State. It is noted that a survey of the prune industry production problem is nearly ready and that a similar survey is in progress of the currant industry in the irrigation districts.

788. ST. VINCENT, B.W.I. 633.681
Report of the Agricultural Department for 1938, 1939, pp. 41, 6d.

Experimental manurial trials with arrowroot were continued and the effects of phosphate and potash applications noted. Statistical analysis of results showed that manurial treatment had exerted a significant effect on yield at the three centres of the trial and that there was no significant interaction between phosphate and potash. The variation of response according to soil type was seen clearly. It is noted that all St. Vincent soils have a relatively high iron content and that this may tend to complicate the behaviour of phosphate.

789. U.S. DEPARTMENT OF AGRICULTURE. 63
Food and life. Yearbook of Agriculture, 1939.
 Supt. Documents, Washington, D.C., 1940, pp. 1165, \$1.50.

This issue, though of universal interest, does not directly concern the horticulturist. It is divided into two parts, which dealt with human nutrition and animal nutrition respectively.

790. IMPERIAL COUNCIL OF AGRICULTURAL RESEARCH, INDIA. 63
Indian Farming, Vol. I, No. 1, Jan. 1940, pp. 50, 8 as.*

We welcome the first number of a new journal to be published monthly by the Imperial Council of Agricultural Research, India, under the title Indian Farming. This journal takes the place of Agriculture and Live-stock in India, which after 9 years of useful life retires to make way for a publication providing the same description of scientific information but in a form that it is hoped will appeal to cultivators and to those furthering the work of rural development. The annual subscription is Rs 6 or 8 annas a single number. Besides a number of original articles there is given under the title "What the scientists are doing", a summary of recent results achieved in various branches of agricultural research. If this feature is maintained it should do much to open the eyes of the farmer and grower to the numerous ways in which progress is possible and to the efforts which are being made on his behalf. The scientific worker too will be grateful for these concise summaries.

* Annual subscription rate 6 Rs, payable to The Manager of Publications, Civil Lines, Delhi.

791. NANKING. 63
Agriculture and Forestry Notes, Chengtu, China, published approx.
bi-monthly.

Attention is drawn to this publication of the Nanking University in exile. It is published every two or three months and contains notes which should more than suffice to keep alive agricultural education and research until such time as the full life of the University can be restored. Notes are included in Nos. 4, 5 or 6 of 1939 on the following subjects of horticultural interest :—
(4) Distribution of improved vegetable seeds and tree seedlings ; fighting citrus storage diseases.
(5) Co-operative storage and marketing of sweet oranges at Chiangtsing ; vegetables in Western Szechwan ; mushroom culture ; botanical and forestry survey trips. (6) Training courses in horticulture ; work on sweet oranges ; storage of Grimes Golden apples ; work on vegetable crops ; increased tung oil tree planting in Szechwan ; surveys on citrus fruit pests and other problems in Szechwan. [It is suggested that the publications of Institutes which previously sent to the College of Agriculture are, if possible, even more welcome at its present address at Chengtu, Szechwan, China. ED.]

792. BRITISH GUIANA.
Divisional Reps. Dep. Agric. for 1938, 1939, pp. 99.